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The American Marine Congress

THE Marine Congress that is to be held in New York City during American Marine Week deserves and should receive the hearty support of every organization, concern and individual having to do with American ships and shipping. It is the first real attempt that has ever been made in the marine field to bring together not only those who make a living out of the industry but also all commercial, manufacturing and farming organizations, concerns and individuals interested in water transportation.

America will never have a really great merchant marine until the importance of that industry to the welfare and progress of the country is thoroughly understood. In the past a lot of educational work has been done by various organizations; but no attempt has heretofore been made to get everybody around one table for a frank discussion of the subject. It is just that, that the American Marine Association had in mind when it formulated its plans for the Congress in November. It has succeeded in building committees composed of men best qualified to represent the several interests concerned; and the movement has the backing of the Hon. Herbert C. Hoover, Secretary of Commerce, who has been out-spoken in his belief that the proposed Congress will do much to effect a better understanding of the necessity for an American merchant marine.

We bespeak for this Congress the support that these industries as a whole can give when once convinced that the purpose is right.

Why Government Ownership?

WHILE the question of Government ownership and operation of Shipping Board vessels had not been determined at the time this issue of MARINE ENGINEERING AND SHIPPING AGE went to press, nevertheless that course was threatened to the extent that a committee of three members of the board had been appointed to formulate a workable plan.

First, let us make it clear that we do not believe in either Government ownership or Government operation as against private ownership and private operation in any industry. The reasons are too well known to warrant discussion here. For results in a field closely parallel to the marine field, we have but to point to the consistent failures in the railway field in all of those countries of the world that have tried it, including our own experience in the last war. President Harding in his speech at Kansas City on June 22 said, on the question of possible Government ownership of railways: "In the present state of the public treasury and of tax burdens, and in the light of recent sad experience with Government management, this is not to be considered. I believe it would be politically, socially and economically disastrous."

With the marine field, however, there is the added and very important difference that while with the railways the question is national, with ships, other than those in coastwise traffic, it is international. There, successful operation means profitable return cargoes; and ability to get profitable cargoes from foreign countries means a flexible organization capable of securing the business and making rates and changing destinations at a moment's notice—something absolutely impossible under Government ownership, notwithstanding that at least one member of the Shipping Board has stated, in connection with cargo vessels, that the Government would keep surplus ships in various ports ready for instant loading and would quote rates sufficiently low to meet any competitor.

Now, what is the Government's plan insofar as it has progressed? The Shipping Board has seven members; and at the moment there are seven different opinions as to the course to be followed. Out of the confusion of opinions looms a scheme involving the formation of some eighteen different companies. If eighteen "companies" means that many corporate entities, the present loss of some fifty millions of dollars a year would soon be multiplied several times and in fact would probably be multiplied at least twice under any plan that may be evolved, because experience has

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taught us that no Government can operate any business at anything other than an imaginary profit; that if the loss is now fifty millions of dollars a year with a number of ships being operated by private corporations, the loss under full Government operation would be far greater on a like accounting basis.

But if the Shipping Board is determined to go ahead, why the very considerable additional executive overhead and red-tape incident to eighteen separate corporations? Why the added burden on the taxpayer when it is possible by concentration of routes and a departmental organization to carry on with one corporation? There is plenty of precedent in the business world for the manipulation of numerous units by one corporate body with one board of directors and one executive head, the scattered units being but departments of the whole.

We have said that within the Shipping Board there are seven different opinions as to how the threat of Government ownership and operation should be carried out. There is a still further complication than that for substantially all of them either do not favor Government ownership or are opposed to that course. This is especially significant in view of the fact that all are political appointees and might be expected to line up on the other side of the fence. In any event, because of those differences and the attitude of the country generally toward Government ownership and operation; because of the slogan of the present administration—"less Government in business, more business in Government"—which has been so well reflected in the work of some departments at Washington, especially the Department of Commerce; and because of the very serious effect Government ownership and operation on the seas will have on the American merchant marine as a whole, why not a renewed effort to find a way out of the present dilemma?

First, scrap all ships which cannot possibly be sold because unfit for profitable operation. They are in any event as much of a menace to the progress of the American merchant marine as are derelicts to navigation. Then sell all of the others to private owners either after first installing Diesel engines and in other ways refitting for competitive business such of the vessels as would be amenable to that treatment, or else authorizing the purchaser to do so, the job to be financed by the Government. With that determined, the question of price only would be left; and while not an easy nut to crack, it is far from being insurmountable. Some routes and vessels could be sold outright at predetermined figures. As to the others, an equitable course should not and would not be hard, if approached from both sides in the right spirit. The Government could well afford to make contracts for the operation of routes and ships on a specified income or interest and time payment basis, the ultimate purchase price to be determined by the results from operation for a given period. Perhaps prospective purchasers should be asked to pay a fixed minimum in cash at the start, the excess to be determined in the manner suggested. At any rate, the result would be the elimination of a Government expense of at least fifty millions of dollars a year and the return to the Treasury of some part of the cost of the ships, at the same time giving new life and increased determination to the American merchant marine as a whole and a new hope to that great industry which has to do with building, repairing and equipping ships and which is now suffering unnecessarily because of the present chaos, in which the Government is playing so important a part.

"Squandering Good Will Abroad"

ONE of the best arguments for an American merchant marine is that our own ships would assure our farmers and manufacturers of a regular and reliable source of delivery of their products to foreign markets without transshipment. But such is the perversity of this God-favored nation, that the minute anything approaching boom times appears, the producers forget that foreign trade is absolutely essential "to level out the valleys of periodic depression in business cycles and to keep their factories and farms steadily employed."

In a recent article Mr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce said, "an old abuse, so costly in the past to American prestige abroad, is again creeping into our export trade. Under the allurements of domestic boom conditions many of our manufacturers are showing increasing apathy to the legitimate requests and orders of foreign contacts whose patronage they so carefully solicited during the past few years. The sound policy of definite allotments for export is being ignored in far too many cases. Unless this disloyalty to firmly establish foreign contacts is promptly overcome, American commercial prestige and good will abroad are likely to suffer serious damage."

According to Mr. Klein, "a number of British firms who are representatives of American manufacturing exporters are sick and tired of the foreign trade flirtations of their American connections whose export interest shifts with every vibration of domestic demands." It takes years of patience and hard work to build up a foreign business and, if the results of all the efforts that have been made to obtain an outlet for our surplusage are to be thrown away because our manufacturers are temporarily having trouble in supplying the domestic demand, then it is a situation that affects not only the merchant marine but every citizen in the country. This is a matter that should receive the serious attention of our commercial organizations.

Insurance Tax Vetoed

EFFECTIVE pressure was brought to bear upon Governor Smith by powerful insurance brokerage interests who urged that the Sheridan Act would prove a serious injustice to shippers in this country who find it impossible to secure full coverage here, and the Governor vetoed the bill. This was Senate bill 1690, printed number 2289, entitled "An act to amend the tax law and to impose a tax upon residents of the State and upon persons transacting business therein, insured against loss of property by insurers not authorized to transact business in the State." In his memorandum accompanying the veto the Governor gave, as his reasons for withholding approval, a belief that when New York companies are unable to write the insurance there should be no penalty attaching to the insured for seeking protection to his property elsewhere. It was brought out at

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the hearing that when the United American Line recently sought four million dollars' coverage on specie shipped abroad it was unable to secure more than a small portion of the insurance in New York State. Under the provisions of the proposed bill a tax would run to the insured of 25 percent on the insurance written with companies not authorized to transact business in this State. "This," said the Governor, "is not the time to handicap men who are endeavoring to build up an American merchant marine; nor is it the time to add to the cost of doing business in this State, and particularly at the Port of New York."

Grain Bulk Carriers

DURING the last six months no less than twelve Italian steamers have been lost in the grain bulk carrying trade. Underwriters are trying to find out whether this series of disasters is attributable to the type of vessels or to their nationality. Once grain starts to shift, unless the vessel is small enough to admit of manual labor correcting the situation, the case is next to hopeless. A list at once begins and the grain flows like water to increase it. Foundering is almost certain to result. And there is subsequent trouble over the insurance, because the reason for the disaster did not lie with a peril of the sea but in the inherent nature of the cargo.

Combined Riveting and Welding

IN converting the battleship *Kearsarge* into a seagoing crane-ship with a lifting capacity of 250 tons, the whole ship structure had to be materially reinforced in order to take care of the stresses imposed by the presence of the crane and the possible loads that might be placed on her decks. As pointed out in a full description of this crane-ship appearing in the June issue of *Mechanical Engineering*, the official organ of the American Society of Mechanical Engineers, it was even thought necessary to reinforce the riveted joints in some of the strength members by welding.

So the main deck, which is composed of three thicknesses of plating, was, in addition to its riveted connections, electrically butt welded throughout the top strake thus making that member practically one piece of metal. Likewise, it is stated that it was found difficult to select angle irons for connecting the strength bulkheads to the under side of the deck that would have sufficient metal left after the necessary rivet holes had been drilled. It was decided that this problem could be solved by welding the toes of the double bounding angles to the bulkheads for the purpose of taking a large portion of the shear stress off the rivets.

The performance of this crane-ship will be watched with interest for many reasons. It is the only sea-going crane-ship and, at the same time, the largest floating crane in existence. It has already actually lifted 312 tons and may be called upon to lift an even greater weight. The size of the structure has called for a design that exceeds well tested limits. But has it in dealing with stresses of unprecedented magnitude solved the problem of the most efficient joint? Can the condition where there is not enough metal left in a plate, or enough plate and not enough rivets be solved by additional welding? Will a combination of riveting and welding work in unison or will the weld which unites the metal in one piece take the entire load and the elastic limit of the joint be reached before the rivets begin to work? If riveting can not be depended upon for such a connection why not make an entirely welded joint?

The Hull Slump

UNDERWRITERS have had ample opportunity for reviewing the unusual conditions of the past two years, and they are now in position to reflect intelligently upon the circumstances that have militated so seriously against them in an attempt to secure a modicum of profit in writing hulls. The war caused the first great upset, but this was scarcely worse than the astonishing boom in shipping and its subsequent slump. An outstanding feature of underwriting in this period has been the enormous loss of money paid out for "return premiums." This was occasioned by the violent fluctuation in shipping values, which necessitated rearrangements in insurances, sometimes repeatedly during the year. Policies were frequently cancelled after only a month or so had run off, the premium for the balance of the twelve months being returned, generally with a "short period" rate adjustment amounting to 20 percent in reduction. These insurances would be renewed, but always on a substantially reduced valuation. In many instances the underwriters returned more premium for the unexpired period of the old policy than they received for the twelve months of the new.

A North Pole Risk

NOW and again the underwriter is called upon to extend his protection to adventures that tax his ingenuity as regards an approximation of the measurement of hazards involved. But to the experienced insurer there is nothing that can not be written, and with a fighting chance at a profit. Thus, there has been recently placed in the New York market the insurance on the yacht *Bowdoin* which Dr. Donald B. MacMillan is to use on his projected trip to the North Pole. The value of the vessel is $30,000, and as she was built expressly for Arctic work it is likely that the Doctor is not far from the mark in esteeming her the strongest little craft in the world. The voyage is planned to run from Wiscasset, Me., along the Labrador coast and thence northeast to Greenland, following the Greenland coast northward for a wintering in Ellesmere Land. That is where the underwriter's worries begin—for "wintering" in the Arctic means being frozen in. There the *Bowdoin* will lie, snug and tight, serving as a headquarters while the expedition is pushed northward over the ice.

What do they expect the underwriters to do? Insure the vessel for the round trip, including the period of being frozen in, against the risks of total and/or constructive total loss and general average and salvage charges. In the judgment of the insurers this was scarcely an undertaking exactly within their sphere; but as it was an American enterprise and for laudable purpose, they did not hesitate to participate. The entire risk was placed in the New York market at a rate of 12½ percent.

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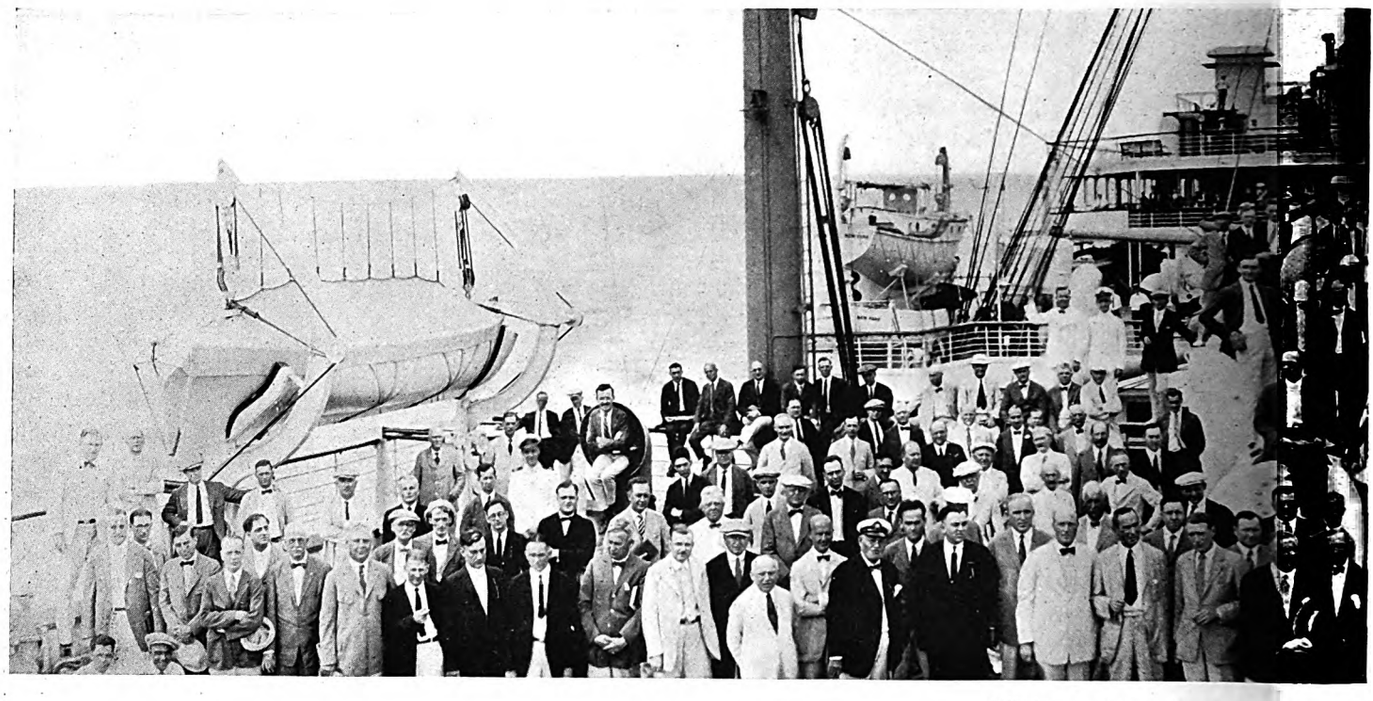

Officials and Guests on the Leviathan

Leviathan on Trial Trip Breaks World Records

687 Miles in 25 Hours at Average Speed of 27.48 Knots — 28.04 Knots in One Hour

By Harold F. Lane*

ALL established world records for sustained speed by an ocean liner, as well as the speed record for one hour, were broken by the *Leviathan,* reconditioned at the Newport News Shipbuilding and Dry Dock Company on the return run of its trial trip, made from Boston to Abaco in the Bahamas and back to New York, June 19 to 24, under the command of Captain Herbert Hartley, and under the supervision of Gibbs Brothers, Inc., who have had general charge of the reconditioning and the trial trip for the Shipping Board.

After leaving Boston under somewhat of a cloud of ignorant and partisan or malicious criticism and, it is reported, with some fear on the part of Shipping Board officials that an effort would be made at the last minute to stop the trip by injunction as an unnecessary "joy ride," the big ship came back with the broom at its masthead and the passengers filled with new enthusiasm for a successful American merchant marine which the enormous amount of publicity the trip received helped to spread among the public.

During the 25-hour period from 7:17 A. M. on June 22 to 8:17 A. M. on June 23 the *Leviathan* made a distance of 687 nautical miles, from Jupiter Light, off the coast of Florida, to a point approximately off Norfolk, Va., at an average speed of 27.48 knots. For the first hour of that period the average speed was 28.04 knots and for 6 hours of the time the average was over 28 knots, while for 12 hours the average was 27.94 knots.

The distance run for the 25-hour period is 11 miles more than the best record ever made by an ocean liner, that of the *Mauretania,* which, on January 25 and 26, 1911, made 676 miles in 25 hours at an average speed of 27.04 knots. The highest speed made by the *Leviathan* for an hour also exceeds the fastest speed of the *Mauretania* by approximately half a knot.

Credit Given to President Harding's Encouragement

Albert D. Lasker, who retired as chairman of the Shipping Board on the day of the start of the trial trip, sent a radiogram to President Harding informing him of the accomplishment immediately upon the announcement of the record made by the *Leviathan,* which, he said, was reconditioned through the constant encouragement the President has always given the merchant marine. "Thus, through its first big ship, in its first trial run, America has the largest, the finest and the fastest ship in the world," Mr. Lasker said, "an inspiring premier ship to our merchant marine. May this performance enthuse our people as it should and be some return to you for your constant interest in and enthusiasm for America on the seas. It is an historic tribute to the genius of those who redesigned and rebuilt the *Leviathan,* champion of the seas, her officers and crew."

Route of the Trial Trip

The trial trip was from Boston to Abaco Island, then through Providence Channel and northward in the regular northbound steamer track, via Jupiter Light and Diamond Shoals to New York, a total of 2,209 miles.

On June 18 the ship was taken, partly under tow and partly under its own power, to a point just outside Boston Harbor where the start was made at 3:20 P. M. on June 19.

From Boston Light Vessel anchorage it was the intention

* Our Washington correspondent.

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During Her Trial Trip, June 19 to 24

to maintain the engines at approximately 150 revolutions per minute for a 12-hour period but early in the evening an unusually dense fog set in which remained throughout the night and it was necessary to reduce the speed from 18 to 8 or 9 knots. On June 20 and 21 the revolutions were gradually increased for 10 and 12-hour periods to 160, 170, 175 and 180 per minute and the speed increased to about 23½ knots. From noon of June 20 to noon of June 21 the

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Congressman Martin B. Madden, of Illinois, Gets Some Figures from Mr. Lasker

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Mr. Lasker and Senator Fletcher, of Florida, Have a Friendly Discussion

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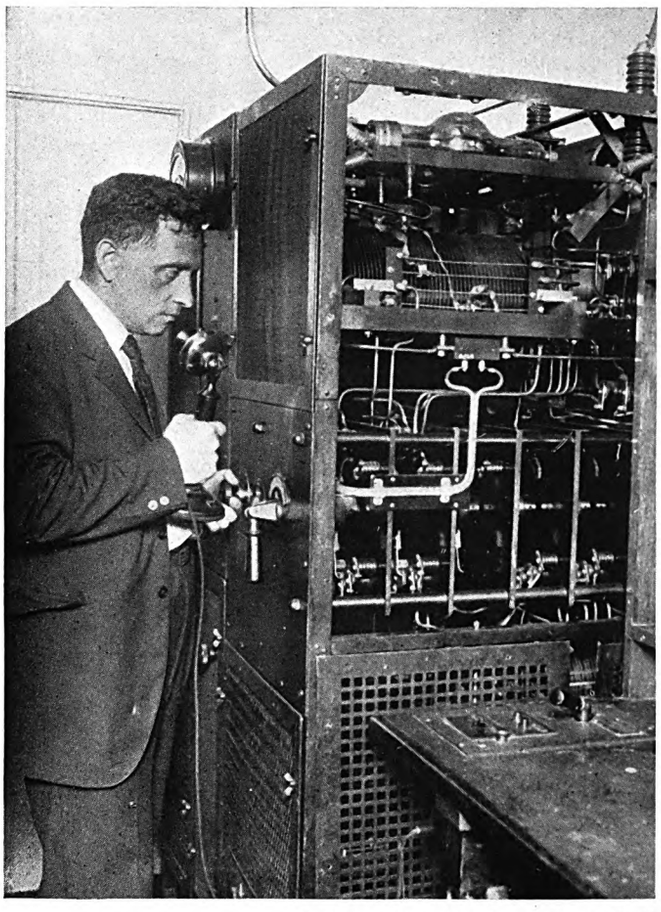


Photograph by Kadel & Herbert, N. Y.

J. R. Irwin, First Radio Operator of the Leviathan, Who During the Trial Trip Handled Nearly 7,000 Words in 6½ Hours Without Relief

average speed was 22.1 knots and the distance covered was 530 miles. Abaco Light was passed about midnight on June 21 and the passage through Providence channel made during the night.

The high-speed test was begun when Jupiter Light was passed at 7:17 and on June 22 when the revolutions were increased to the maximum and shortly after 10:00 A. M., a bulletin signed by Staff Commander H. C. Fish announced that up to that time the ship had made 75.7 miles at an average speed of 28.04 knots.

At noon of June 22 the distance from Jupiter was 132 miles, the average speed was still 28.04 knots and the ship was approximately off Daytona, Fla., having made 590 miles in the 24 hours. Succeeding bulletins issued by Staff Commander Fish or Captain Hartley gave the distances and average speed from Jupiter as follows:

2:00 P. M.	188 miles	28 knots
4:00 P. M.	243 miles	28 knots
6:00 P. M.	300.6 miles	28.1 knots
8:00 P. M.	355 miles	27.94 knots
10:00 P. M.	411 miles	27.96 knots
8:17 A. M.	687 miles	27.48 knots

12:00 M. June 22 to 12:00 M. June 23, 595 miles, 25.2 knots

LOG OF THE RECORD-BREAKING TRIP

Later there was printed on board and issued to the guests the abstract of the log printed on this page.

Only a few minutes after the completion of the 25-hour run, the ship then being off the Chesapeake Capes, a fog set in which made it necessary to run very slowly until after noon and at one time to stop entirely upon a signal from another vessel close ahead. The fog continued throughout

TRIAL TRIP JUNE 18TH TO JUNE 24TH, 1923

Date	Hour	Lat. N.	Long. W.	Miles	Remarks
June 18	12.58 A.M.				Left Commonwealth Dry Dock.
	3.59 P.M.				Anchored off Boston Light Vessel.
June 19	3.20 P.M.				Hove up anchor and proceeded to sea.
June 20	12.00 noon	38.09	70.26	300	Dense fog throughout night. Steamed at reduced speed. Smooth sea. Ave. speed 14.6.
June 21	12.00 noon	30.08	74.50	530	Fine and clear weather. Small sea. Average speed 22.1.
June 22	12.00 noon	29.09	79.40	590	Fine and clear weather. Smooth sea. Average speed 24.58.
June 23	12.00 noon	37.31	74.08	595	Morning watch ran into dense fog. Steamed at reduced speed. Average speed 25.2.
June 24	4.47 A.M.			194	Arrived Ambrose Light vessel in thick fog. Steamed at reduced Speed. Ave. speed 11.6.
				2,209	Total distance

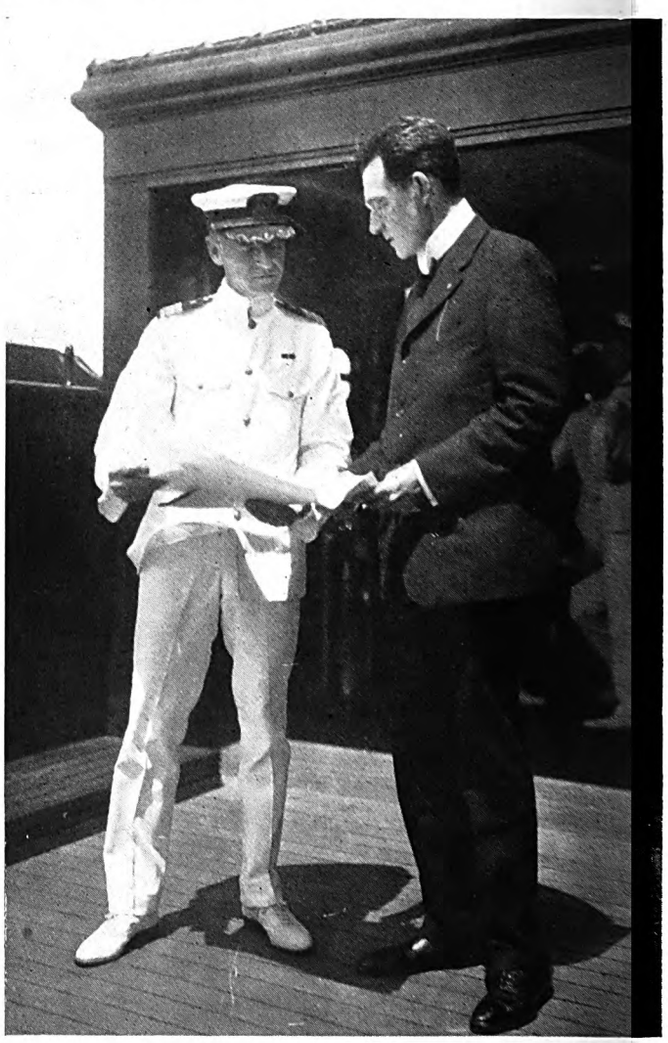
Jupiter Light House abeam 7.17 A. M., June 22d. Then followed the regular north-bound steamship track to Diamond Shoal Light vessel, arriving there 3.39 A. M., June 23d. Distance, 570 miles. Ship making an average speed of 27.99 knots.

From Jupiter Light House to lat. 36.52 N., long. 74.21 W., a distance of 687 miles, was made in 25 hours, making an average speed of 27.48 knots.

During the first hour of the trial run from Jupiter Light, the average speed of the vessel was 28.04 knots, and for a six hour period the average speed of the vessel was 28 knots.

the day and night and until late in the afternoon of Sunday, June 25, making it necessary to anchor off Ambrose light until nearly 5:00 P. M. The dock was reached about 8:15 after the ship had been accorded a noisy welcome by the whistles of every craft in the harbor.

On the original German trial trips the *Vaterland,* as the



Captain Herbert Hartley and W. F. Gibbs, President, Gibbs Brothers, Inc., Who Had Charge of Reconditioning the Leviathan

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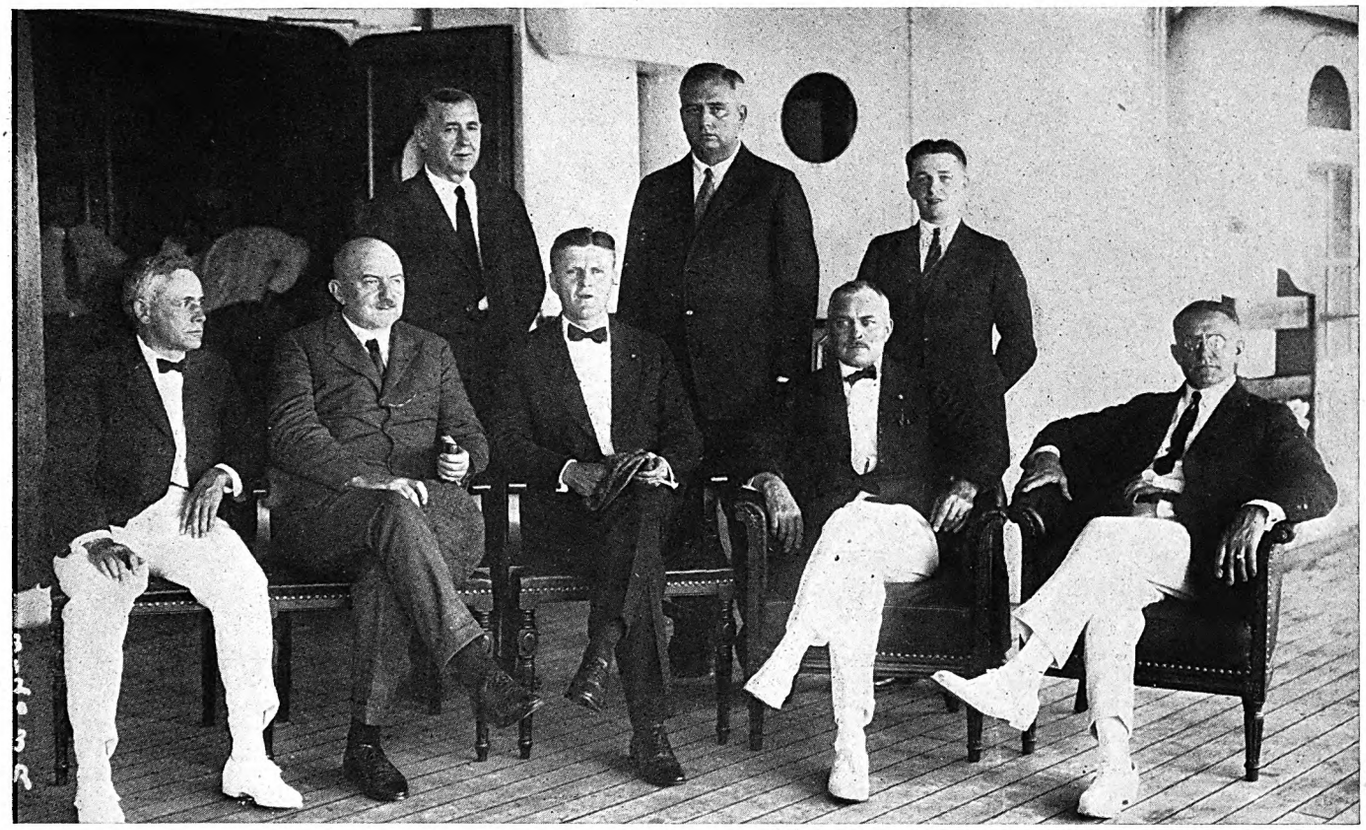

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The Trial Board on the Leviathan's Record Run

Left to right (seated): H. Brown, Captain C. A. McAllister, Captain R. D Gatewood (chairman), Captain W. E. Griffith, A. S. Hebble. (Standing): J. F. Metten, Captain J. E. Bailey, C. A. Greaser (secretary).

ship was then called, had made a maximum speed of 25.84 knots burning coal.

The trial trip was made with a crew of 1,135 and with 456 passengers, including Mr. Lasker and Commissioners Thompson, Plummer and O'Connor of the Shipping Board. President J. B. Smull and Vice-presidents W. J. Love and J. F. Sheedy of the Emergency Fleet Corporation, President Homer Ferguson and officials and experts of the Newport News Shipbuilding & Drydock Company, and the other invited guests. The guests included a number of members of Congress, prominent shipping and railroad and business men and newspaper men.

TEST MADE UNDER ARDUOUS CONDITIONS

While the speed record was assisted to some extent by the Gulf Stream and a calm sea as the English record was by the still stronger current of the tides in the English channel, the test was made under most severe conditions in many respects, according to Mr. Gibbs, because of the effect of the high temperature of the semi-tropical seawater on the condensing apparatus. It is important to have as cold circulating water as possible. The circulating water at the time of the high speed run was at a temperature of about 84 degrees Fahrenheit as against about 60 degrees normally found in more northern waters where trials are usually run. As the higher temperature operates against obtaining the highest vacuum in the condensers, the performance under these conditions was considered remarkable. During the time the ship was in colder waters fog conditions prevailed for much of the time. When the ship was built the Germans took it to the North Sea for a test and our Navy trials are usually conducted off Rockland, Me. The warm latitude also afforded an excellent test of the ventilating apparatus.

W. F. Gibbs, who has devoted practically the past four years to planning and carrying out the work of reconditioning the *Leviathan,* as well as the other technical men aboard who had participated in the redesigning, and members of the Shipping Board, were highly elated with the performance of the fuel oil plant and other new equipment, which in many respects exceeded their expectations. It was stated that no new ship of the largest type had ever been subjected to as severe conditions on a trial trip and yet the fuel consumption was less and the power generated, the revolutions per minute and the vacuum attained were greater than had been expected. While official figures as to the engine performance were not given out it was unofficially reported that the horsepower generated was approximately 84,000 and the revolutions per minute 184.

The ship is expected in service to make an average of about 23½ knots, leaving New York on Saturday at noon and arriving at Cherbourg Friday morning and Southampton Friday afternoon, but it was demonstrated that a more than ample reserve margin of power and speed is available for making better time if necessary. Not a pipe leak was found in the entire trip which would require the services of a pipe fitter and it was stated that no more work would be required after the arrival in New York than after an ordinary return trip. The power generated was greater than that for which the ship was originally designed and 25 percent greater than it had ever developed before, without strain. Also the guests were highly pleased with the service and appointments of the vessel.

PERFORMANCE HIGHLY SATISFACTORY TO OFFICIALS

The performance of the ship and the records made were the occasion of many felicitations among the officials and in the evening of June 22 a meeting was held in the first class social room at which moving pictures of the *Leviathan*

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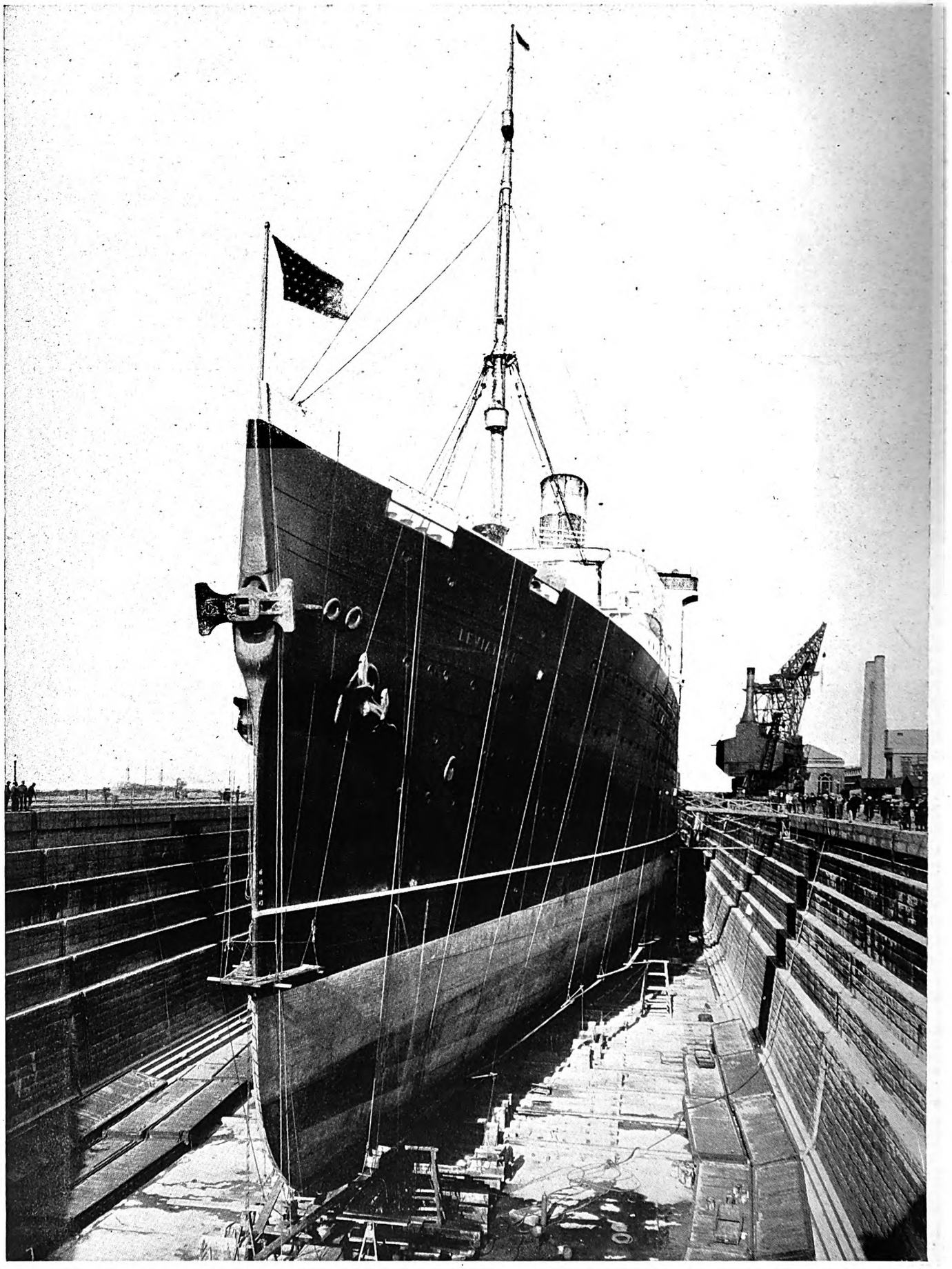

The Leviathan Receiving Her Finishing Touches in Commonwealth Dry Dock, South Boston, Mass., Prior to Her Trial Trip

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"OUT there," in the Golden West, they have the habit of speaking in superlatives, when describing the natural advantages of the country, as the highest mountains, the finest climate and the grandest scenery. While we in the East are perhaps not so favored by the magnificent works of God nevertheless we can point with pride to many of the greatest achievements of man, namely, the tallest buildings, the longest bridges, and now, thanks to the Newport News Shipbuilding and Dry Dock Company, the largest, the safest and perhaps the fastest ocean liner in the world.

It is true that this great ship was originally built in Hamburg, Germany, but she has, with the exception of the outside shell, been practically reconstructed in this country. Extensive structural changes have been made in the hull for the purpose of increasing her strength and safety. It may now be stated that she will still stay afloat even if any three adjacent hold compartments are flooded. She has been converted from a coal to an oil burner. The machinery has been overhauled and repaired. All quarters below the *D* or weather deck are new construction. All passenger accommodations and crew's quarters have been reconditioned, decorated and furnished. Complete new galley and pantry equipment has been provided. An improved electric wiring system, new steam heating, plumbing, ventilation and drainage systems have been installed. Access holes have been constructed in the shell in the way of the fuel oil tanks so that oil sludge and residue may be easily removed when the vessel is in dry dock, new bilge keels have been fitted and, in fact, all the latest and improved fittings and equipment of American manufacture that will add to the safety and comfort of the passengers and vessel have been furnished by hundreds of sub-contractors.

Principal Characteristics

Length, overall	950 feet 7 inches
Length, between perpendiculars	928 feet 5 inches
Breadth, molded	100 feet 0 inches
Depth, molded to *D* deck	70 feet 4¼ inches
Block coefficient	0.625
Class, American Bureau of Shipping.	
Displacement	66,800 tons
Gross tonnage	59,957 tons
Net tonnage, about	28,000 tons
Boilers, modified Yarrow watertube	46
Engines, Parsons direct connected reaction turbines.	
Propellers	4
Officers and crew	1,115
First class passengers	976
Second class passengers	542
Third class passengers	944
Fourth class passengers	936
Decks, steel, extending full length	5
Decks, on superstructure	4

Plans and Specifications

Before work could be started on the *Leviathan* it was necessary to draw up a complete set of plans and specifications. Her original plans were not available and practically all of her interior had been removed to provide sufficient berthing space for from 11,000 to 12,000 troops. This work and the subsequent supervision of her reconditioning was performed by Gibbs Brothers, Inc., New York. As an indication of the thoroughness of their work it may be stated that the plans published in our issue of last November are accurate today.

Bridge Deck

The navigating bridge, located on the forward end of the bridge deck, is shown in one of the accompanying illustrations. It will be noted that it is protected from the weather on the forward side by a bulkhead extending the full width of the deck house and amply supplied with port holes. The sides of the protected area may also be closed by a removable partition. The bridge wings which extend slightly beyond the sides of the vessel are open. A pelorus actuated by the master gyro compass is located on each wing from which azimuths and bearings may be taken. The control for a 36-inch Sperry searchlight is located on the starboard wing.

Inside the protected area are installed the usual magnetic compass and steering wheel, a repeating Sperry gyro compass, engine room telegraphs, telegraphs for conveying instructions for handling the anchors and spring lines, rudder position indicators, pneumercator gages for indicating the for-

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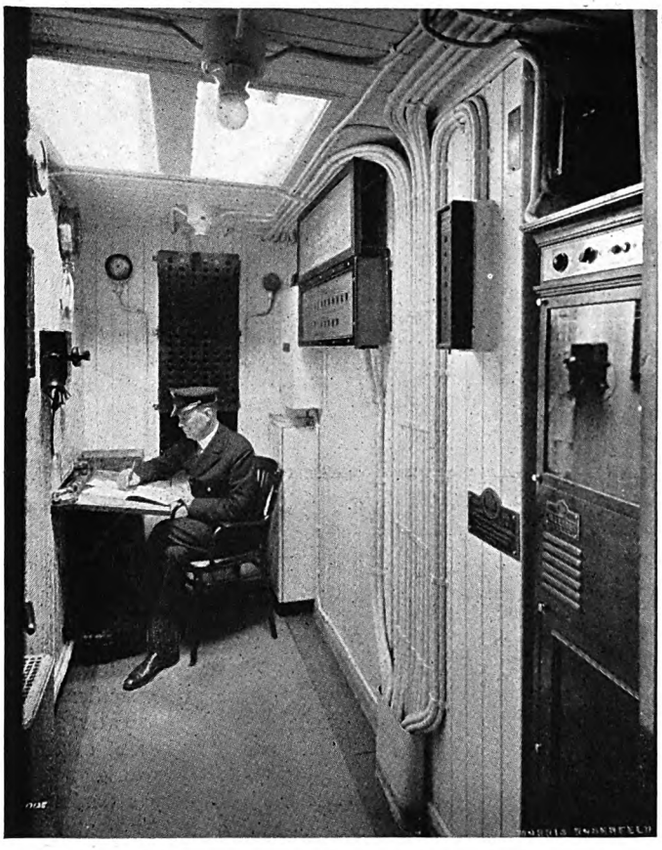
ward, mean and aft drafts and positive and automatic controls for the whistles and fog sirens. On the port side in an inclosed space is the receiving apparatus for the submarine signal system.

WHEEL HOUSE

In the wheel house just aft of the navigating bridge are many more instruments including a 30-day gyro course recorder, a Forbes log for determining both the speed and distance traveled, the watertight door diagram and hydraulic control and a magnetic and a gyro repeater compass. The vessel is provided with two master Sperry gyro compasses located in a special compartment below. They actuate five repeaters—three on the bridge, one in the wheel house and one in the captain's bedroom.

FIRE ALARM STATION

Aft of the wheel house in the officers' quarters is located one of the smallest but most important rooms on the ship,



Fire Alarm Station on the Bridge Deck

called the fire alarm station. In this room, which measures only 4 feet by 9 feet, are housed all the terminals of the different fire detecting and alarm devices. As shown in one of the accompanying illustrations, a man is always on duty here to assure immediate action in case of fire.

Just inside the door is a cabinet with a glass front in the upper portion, known as the "Rich System," for detecting and extinguishing fires. Inside the glass of this cabinet are the terminals of some twenty-two tubes. These tubes lead down to the compartments in the lower part of the ship or hold of the vessel, such as store rooms, baggage rooms, cargo spaces, oil room, lamp room, paint room, refrigerators, etc., which are not frequented by members of the crew. Directly above the cabinet is a suction fan which is constantly in motion, sucking up air from the different compartments. If at any time the slightest bit of smoke occurs in any one of these compartments, it will in the course of only a few seconds find its way to the tube, come up to the station and show in the cabinet.

There are also, in connection with this system, two other cabinets situated on one of the lower decks, where, in case a fire is discovered in any compartment, by lifting a lever the upper part of the tube may be closed and the smoke shut off. Then by opening a valve, steam at a pressure of 240 pounds per square inch is sent down into the compartment filling it with steam and smothering the fire without anyone going near it. However, before turning on the steam it would be advisable to ascertain whether any one happened to be in the compartment, as a puff of smoke from a cigarette will show in the cabinet.

AUTOMATIC ALARM SYSTEM IN LIVING SPACES

Another device for detecting and locating a fire is known as the "Aero Automatic Fire Alarm." In each of the guest rooms, crew quarters, offices, galleys, pantries, etc., there is a rosette located on the ceiling which appears to be of wire but which in reality is a fine hollow tube made of copper. A sudden rise of temperature from any cause in any of these rooms for a duration of 30 seconds will cause the air in the tube to expand and press against a delicate sensitive diaphragm, which, in turn, will make an electric contact that will register the location on the annunciator in the fire alarm station. If, at any time, through accident or other cause, the electric current should be cut off from the system, the attention of the attendant is immediately attracted by a buzzer operated automatically when the current ceases. He will then notify the electrician by 'phone who will locate the trouble.

MANUAL ALARM SYSTEM

Scattered throughout the ship are a number of small fire alarm boxes with a glass front having a red light burning on top. These are known as and are in connection with the "Manual Fire Alarm System." There are forty-five of these boxes, each one numbered, and the members of the crew are required to know the location of these boxes according to their respective numbers. This system is practically the same as that used by the city fire departments, it being only necessary to break the glass to send in an alarm. The breaking of the glass relieves a plunger which forms an electrical contact and registers on the Cory annunciator located in the fire alarm station. It also rings a bell in the station and shows, by a red light, the number of the box in which the glass has been broken. Should one of the red lights on top of a fire box burn out or become loose in the socket; or should a wire become disconnected or broken, or, in fact, if anything should happen to break the current on any of these manual alarm circuits, a green light on the annunciator board will indicate the number of the circuit which is broken and a buzzer will attract the attention of the attendant. The electrician will then be notified of the trouble which must be immediately rectified.

As soon as an alarm comes into the station from any of these systems the attendant steps into the wheel house, which is only a few feet away, notifies the officer on watch and sounds the alarm on the bells which are located throughout the crew's quarters and in the engine room. By sounding the number of the alarm box nearest the fire, the crew are immediately apprised of the proper place to assemble. All of this is done so quickly that it would be impossible for a fire to make any headway. As soon as an alarm is sounded, the engineers on duty stand by the pumps which supply the pressure to the fire main and increase this pressure as needed.

A pressure is maintained at all times on the fire main and a pressure gage indicating it is located in the fire alarm station. If the pressure goes down, the engine room is notified and they immediately attend to it. So, there is never a time that water will not flow from every hydrant.

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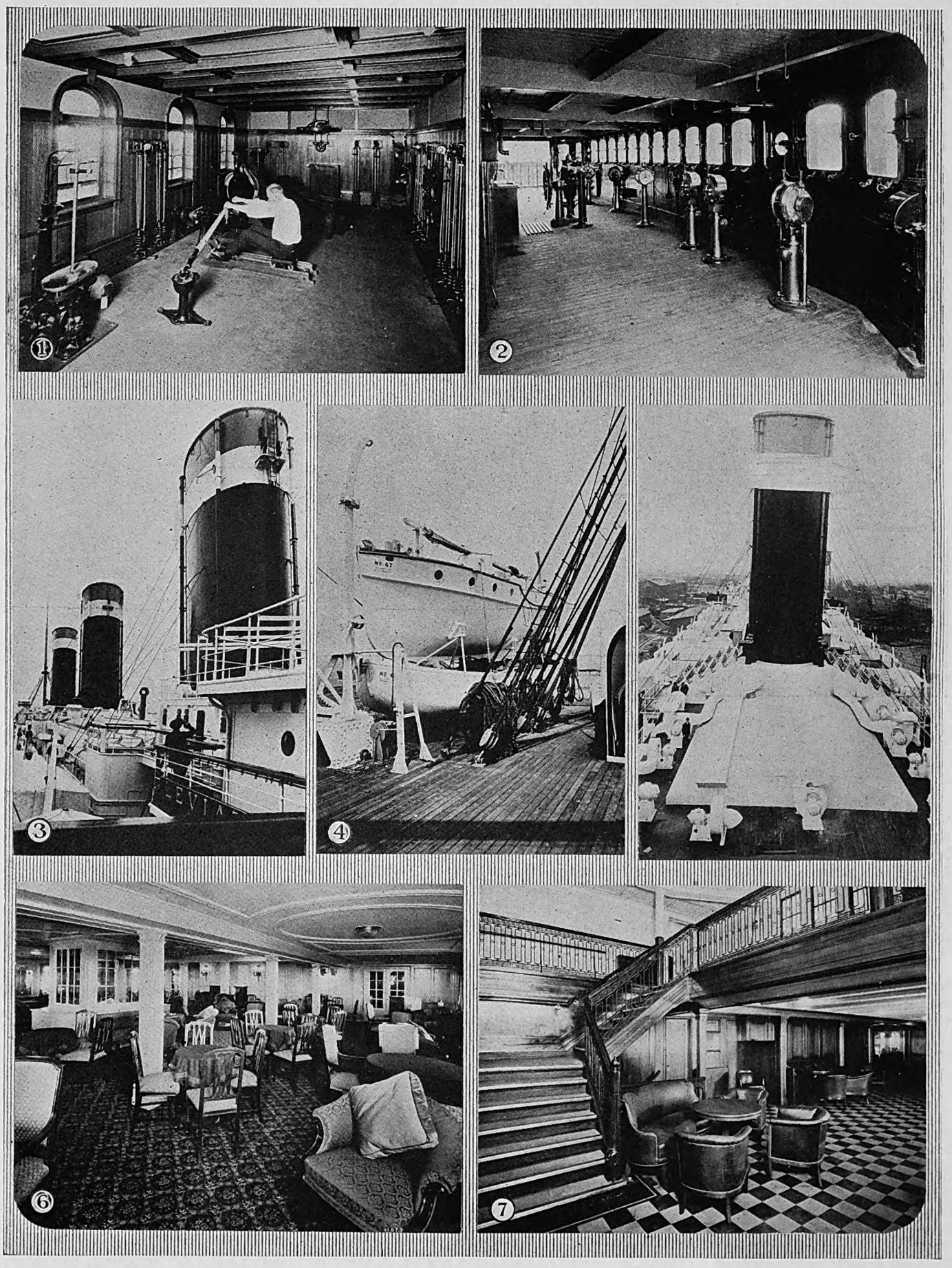

S. S. Leviathan: (1) Second Class Gymnasium, (2) Navigating Bridge, (3) Looking Aft from Bridge, (4) Motor Lifeboat, (5) Looking Forward on Boat Deck, (6) Second Class Social Hall, (7) Second Class Foyer

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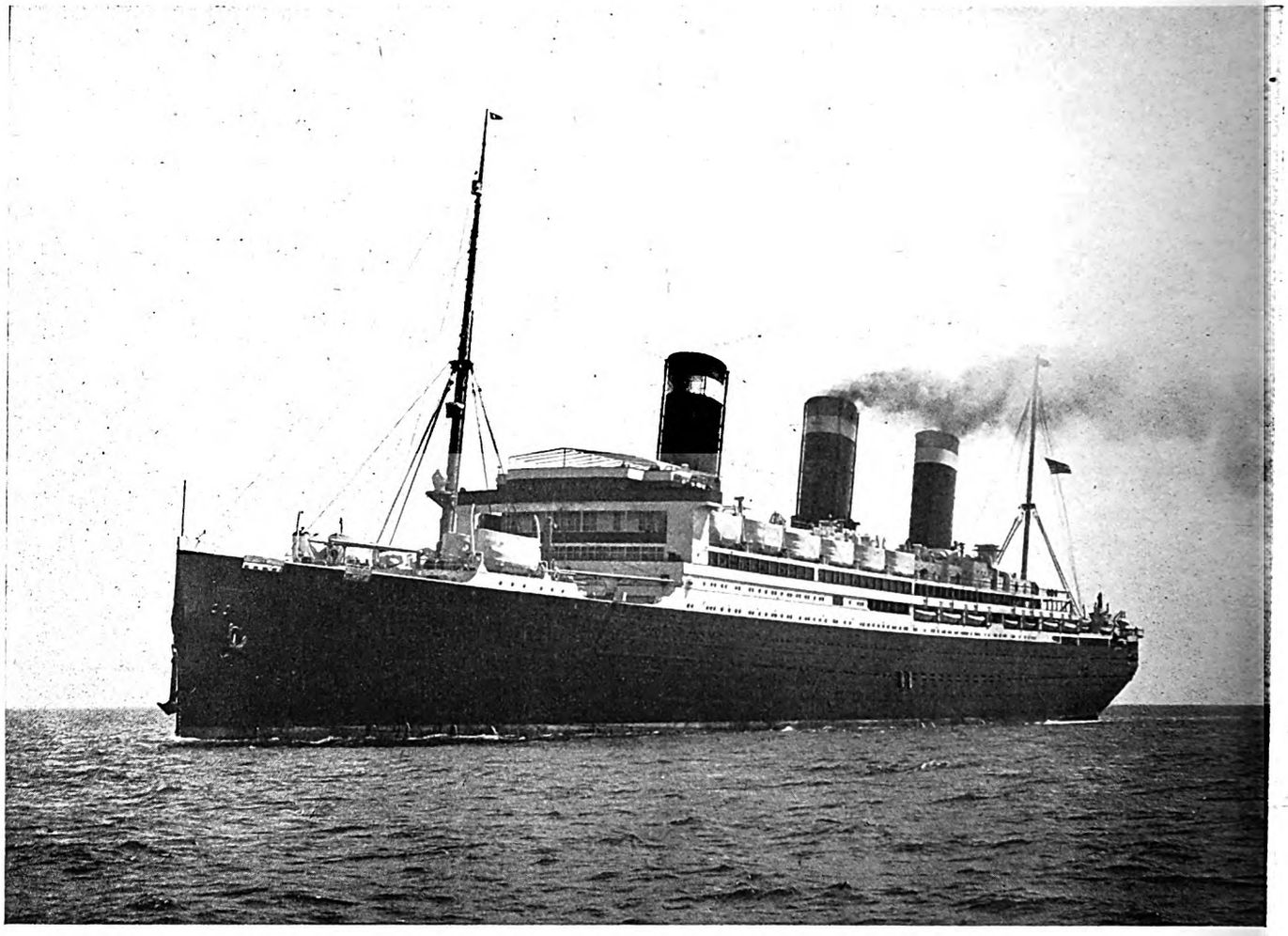

S. S. Leviathan, Flagship of the American Merchant Marine, Ready for Service

FIRE PROTECTION IN THE BOILER ROOMS

With the conversion of the vessel from coal to oil burning it became necessary to provide the utmost protection against the fire hazard involved in the handling, storage and burning of fuel oil. For this purpose a very complete Fire-foam fire extinguishing system was installed by Charles Cory and Son, Inc., New York, designers and installation engineers of the system.

A DECK

The first class smoking room is located at the forward end of the *A* deck directly under the officers' quarters. It is one of the pleasantest rooms on the ship as the forward end of the room is practically all windows that give an unobstructed view ahead. It is paneled in light fumed oak and furnished with leather and tapestry upholstered furniture. With its spacious alcoves and artificial fireplace it should be a comfortable place to while away the time.

The most of the space on this deck is devoted to the upper portion of the public rooms but amidships there is located the first class gymnasium equipped with various devices for keeping oneself fit on the voyage. At the extreme left end of the deck house is the galley of the Ritz-Carlton café, an illustration of which accompanies this article. The galley is equipped with electric ranges, electric bake oven, electric broiler, steam soup kettles, electric meat chopper and grinder, etc., and alongside of it is a room containing an electric ice-cream freezer and an electric griddle.

On the port side forward of the galley is a print shop fitted with three presses, a linotype machine, etc. There is a flower store on the starboard after end of this deck and a dog kennel on the port side.

A deck may also be called the boat deck although a number of boats are located on *C* deck. There are seventy lifeboats, two of which are motorboats. There are also two work boats. The motorboats are specially designed by the Gibbs Brothers and are capable of towing all the lifeboats at once. They are equipped with an oil engine and a radio.

The lifeboats are nested in groups of three and are served by Welin quadrant davits. These davits can be worked in three ways, namely: By a crank attached to the davits, by levers attached to winches through wire rope leads or by electric motors through the winches and rope leads. A Jacobs ladder is stowed between each nest of boats. Lifeboats Nos. 1 to 12 are stowed on the forward island, 13 to 48 on this deck and 49 to 70 on *C* deck, even numbers being on the port side and odd numbers on the starboard.

B DECK

B deck is given up almost entirely to public rooms which are practically en suite. Many of them extend two deck heights and are so large that they give the appearance of being in a large hotel rather than in a steamship.

Forward on this deck is the first class library, the walls of which are finished in Nile green, which are lightened by a white ceiling. Along the forward side of the room are well stocked bookshelves and on the after side is a portrait of President Harding by Howard Chandler Christy. Easy chairs, writing desks and a carpeted floor provide a comfortable and quiet place for either reading or study.

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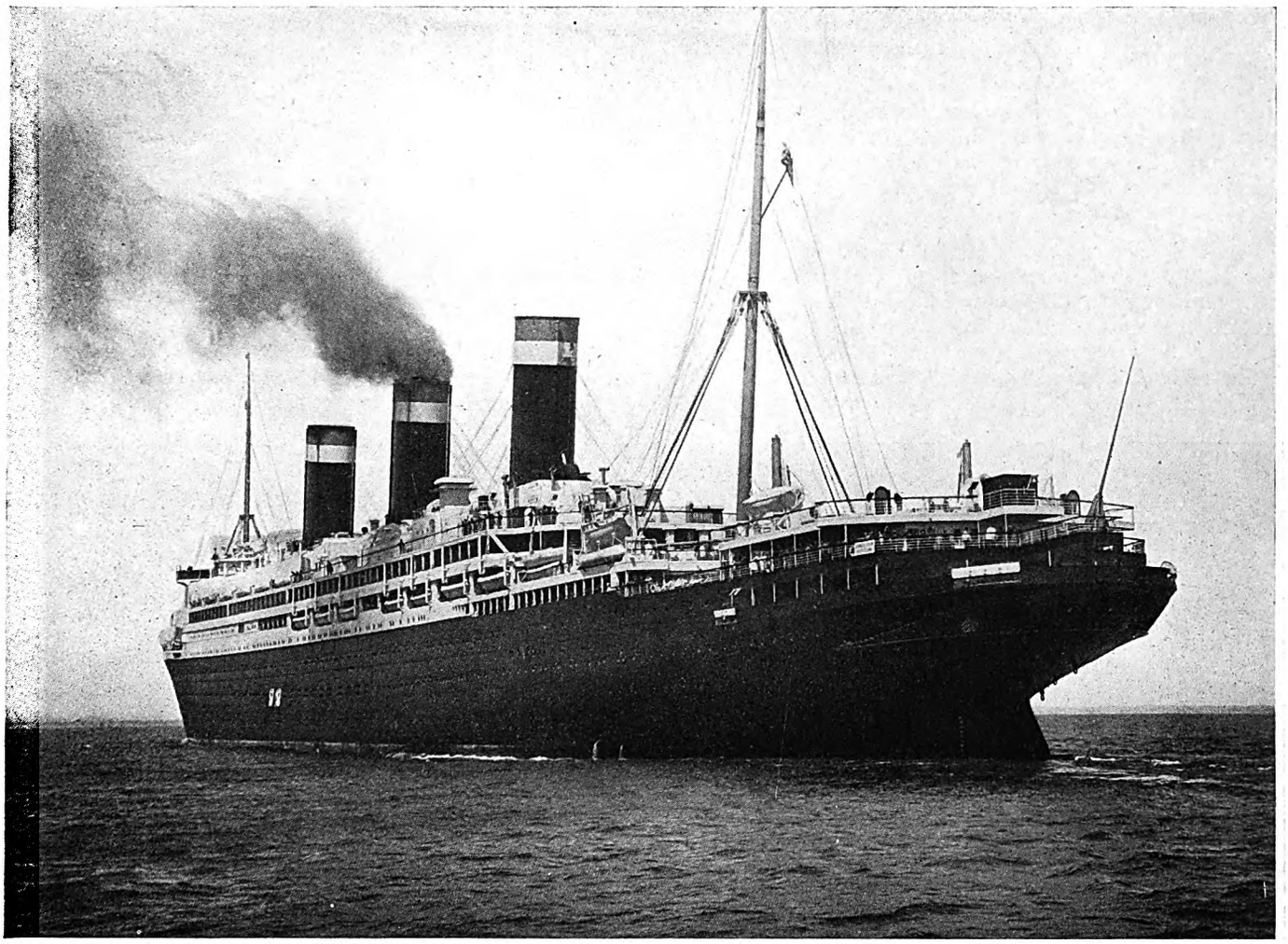

Quarter Stern View of the Leviathan

Aft of the library comes the first class social hall, which may also be used for a ballroom or theater. It is finished in oak and contains several very large oil paintings. Over the center of the room is a large glass dome which is shown in one of the illustrations. At night the dome is electrically lighted and this is supplemented by reflected lights on top of the oak cornice as well as by numerous lights in brackets along the sides of the walls. The stage at the forward end of the hall is finished in oak and has on it a beautiful oak piano. The illustrations probably give a better idea of this room than can be given by a description.

Aft of the social hall is the grand foyer. It will be noted that one of the illustrations was taken in this foyer looking forward into the social hall. Passing aft from the foyer one enters what is really two large rooms in one, namely: the palm court or winter garden, with its palm trees and flowers, and the Ritz-Carlton café, where meals are served à la carte. The walls of the palm court are finished in green lattice work with the chairs and tables painted to blend. Great tall columns and the rich mahogany finish of the Ritz-Carlton restaurant aft of it are features of exceptional decorative interest.

Still farther aft on *B* deck in a space formerly used as a washroom is a charming tea room finished in Queen Anne style, in oak with color prints on the walls.

THE PROMENADE

Around the entire deck is a very spacious promenade, the size of which is shown in one of the illustrations. The forward part is inclosed with balanced glass windows, which may be opened or closed according to the weather. There are three expansion joints in this promenade, which of course, extend from one side of the superstructure to the other.

C DECK

On *C* deck the space outside of the promenade is taken up by staterooms, some of which are in suites and others single rooms, both with and without baths. There are two premier suites, one starboard and the other port, which command $5,000 a passage. These suites contain two bedrooms, a breakfast room, a sun parlor, a drawing room, which may be turned into a bedroom, a kitchenette and three bathrooms. The bedrooms are furnished with twin beds, reading lamps, dressing tables, washstand, davenport, special ventilation through a panel above the beds and many other features.

There are several more suites both on this deck and the deck below containing bedrooms, parlor, bath and trunk room, and, if desired, additional bedrooms may be connected. Typical single staterooms, as shown in one of the illustrations, are paneled in different kinds of wood and are furnished with twin beds, davenport, chairs, reading lamps, dressing tables, hot and cold running water, etc.

On the after end of *C* deck are some exceptionally fine second class staterooms and a veranda.

D DECK

The midship and forward portions of *D* deck are devoted to first class accommodations and the after part to second class public rooms consisting of a smoking room, foyer and social hall, all of which are equivalent in style and comfort to the first class quarters on many ships. The second class smoking room is finished in mahogany with leather uphol-

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stered chairs. The social hall is done in white and is fitted with piano, carpets, bookcase and varied colored upholstery.

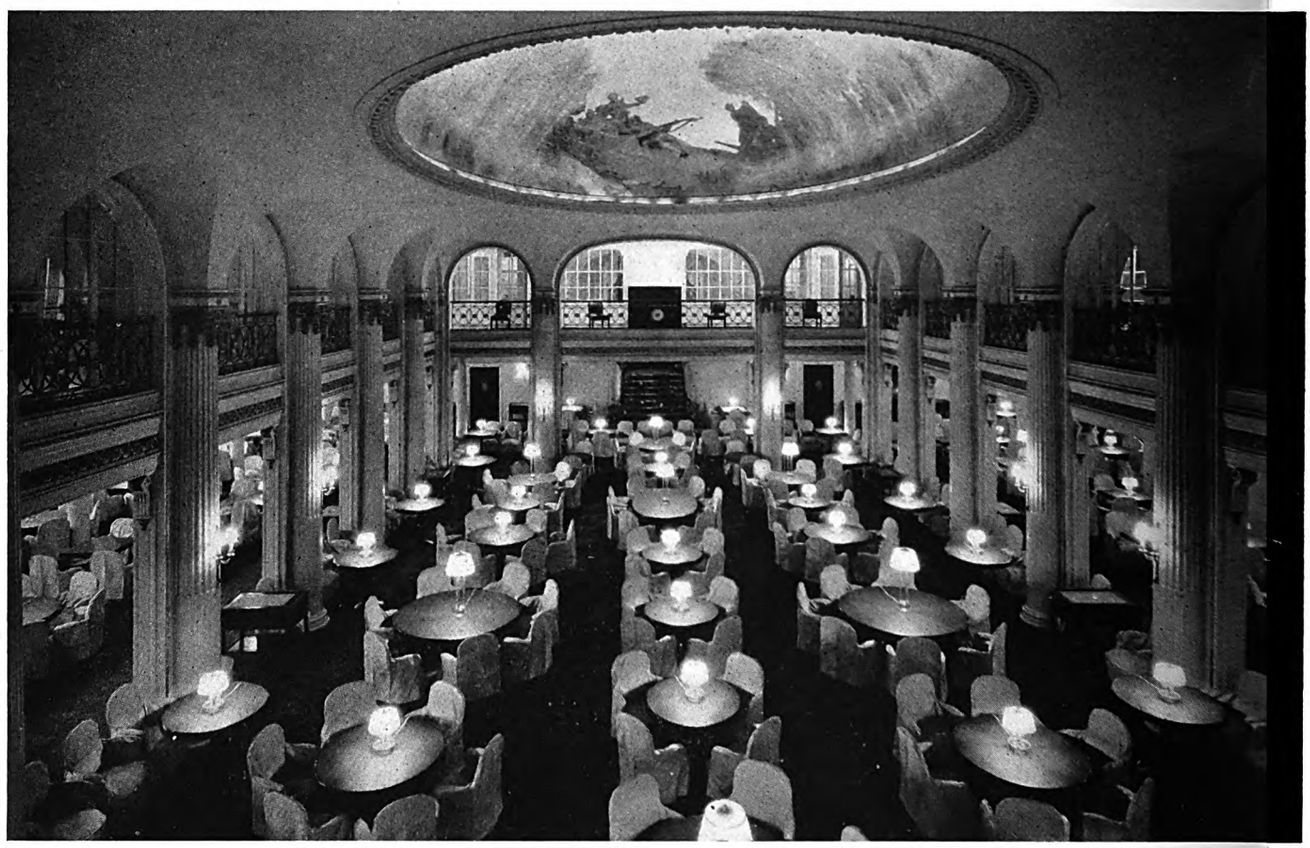
E Deck

As on *D* deck, the midship and forward portions are devoted to first class accommodations. The engineers' quarters and second class accommodations follow aft and the third class dining room is located still further aft.

F Deck

Fourth class quarters are located on the forward end of this deck followed by first class accommodations and the main dining saloon. Then come the first and second class galleys, the second class dining saloon and third class quarters.

The main dining saloon, which reaches clear across the ship, extends two deck heights in the middle portion. It is surrounded by a gallery bordered by tall columns. The room is done in white and has a large painted dome which is surrounded by lights over the center. The illustration of this room shows the tables with their dark blue covers and individual lights.



Main First Class Dining Room

The Swimming Pool

The swimming pool on the deck below, as shown in one of the illustrations, is on the old Roman order. It is not only large in area but also extends two deck heights. A feature of the finish of this room is the stucco work on the walls, which was put on by the Marine Decking and Supply Company. Around the rooms are numerous dressing rooms, a rest room and a room for special baths of electric light and water.

Electric Galley Equipment

The officials who had charge of the reconditioning of the *Leviathan,* had, as a basis, the fact that the German designers had placed aboard the vessel electric bake ovens sufficient for the capacity of the entire vessel, both bread and pastry, and there were a number of other devices such as toasters and broilers used in the a la carte service in the Ritz-Carlton dining and tea room.

Under these conditions and with the elimination of a considerable amount of stateroom heating by electricity, it was found there would be available a fair excess of generator capacity which could be applied for the purpose of electric cooking.

The proposition was divided into three parts: First, all the bakery equipment, which was found to be rather inferior, was to be replaced with modern American design. This consisted of two 25-kilowatt, electric bread baking ovens for the first and second class bakery; one 25-kilowatt oven for the fourth class and crew, and two 9-kilowatt pastry ovens, one for the first and second class and one in the Ritz-Carlton galley. Second, it was desired to use considerable electric heating for serving devices in pantries and dining room service. This service consists of a two-burner heating plate, and rectangular griddles for the preparation of hot cakes, toast, eggs, etc., without the expense of having this type of work done in the main kitchen. There are on board this vessel about five of these griddles and seven of the hot plates located in the various pantries and serving rooms, as mentioned.

Another important part of this service is in the main dining room where the serving tables, from which the food is distributed by the waiters, are equipped with electrically heated tops of the right temperature so that the food can be kept at the proper heat until it is served. In a large dining room where the distance from the serving pantries is very great, this type of device will be of great help. The amount of electric heat taken is very low, about 150 watts per table,

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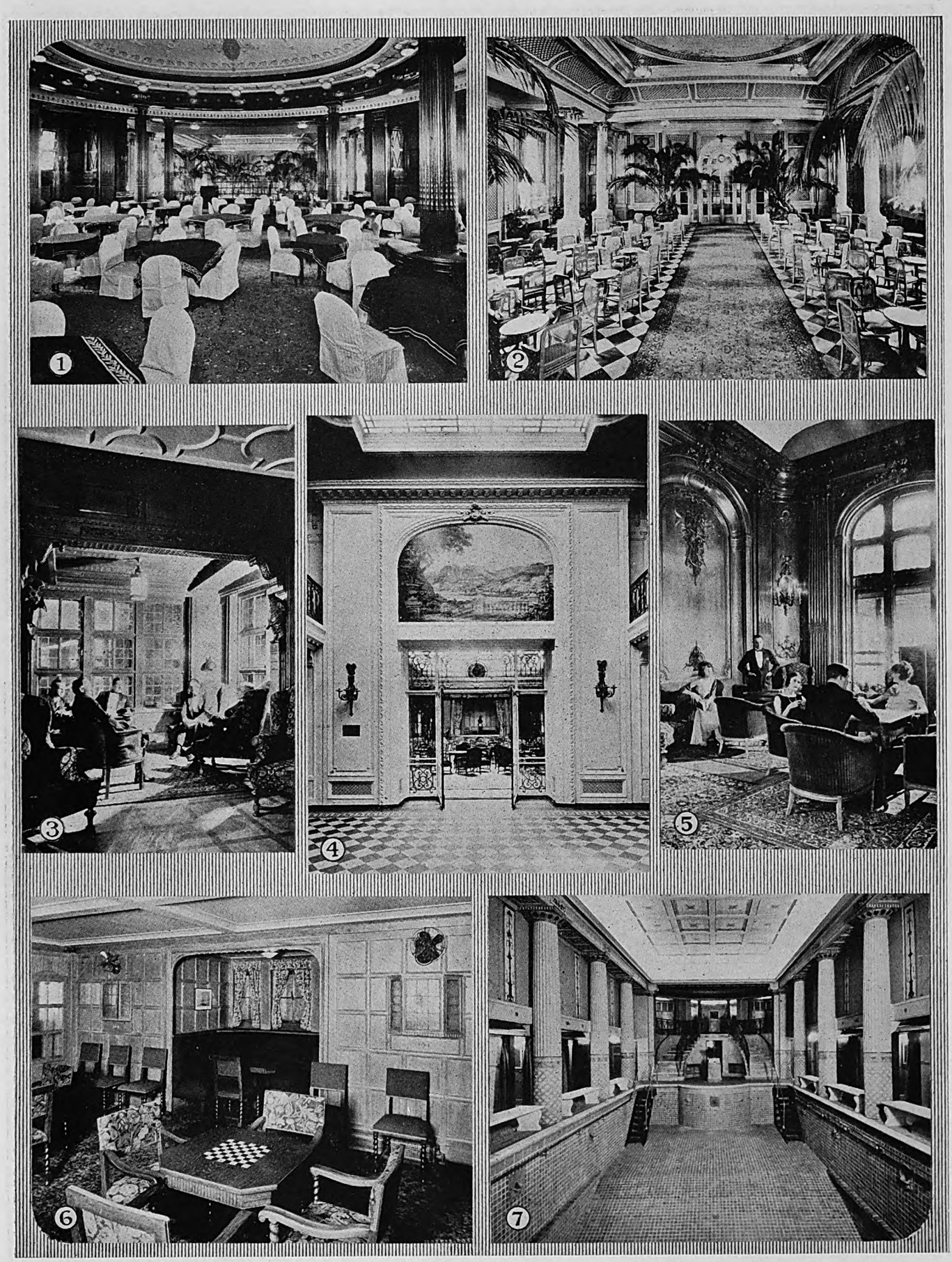

S. S. Leviathan: (1) Ritz-Carlton Restaurant, (2) Palm Court, (3) Alcove in First Class Smoking Room, (4) Entrance to Social Hall in Grand Foyer, (5) Corner of Social Hall, (6) Tea Room, (7) Swimming Pool

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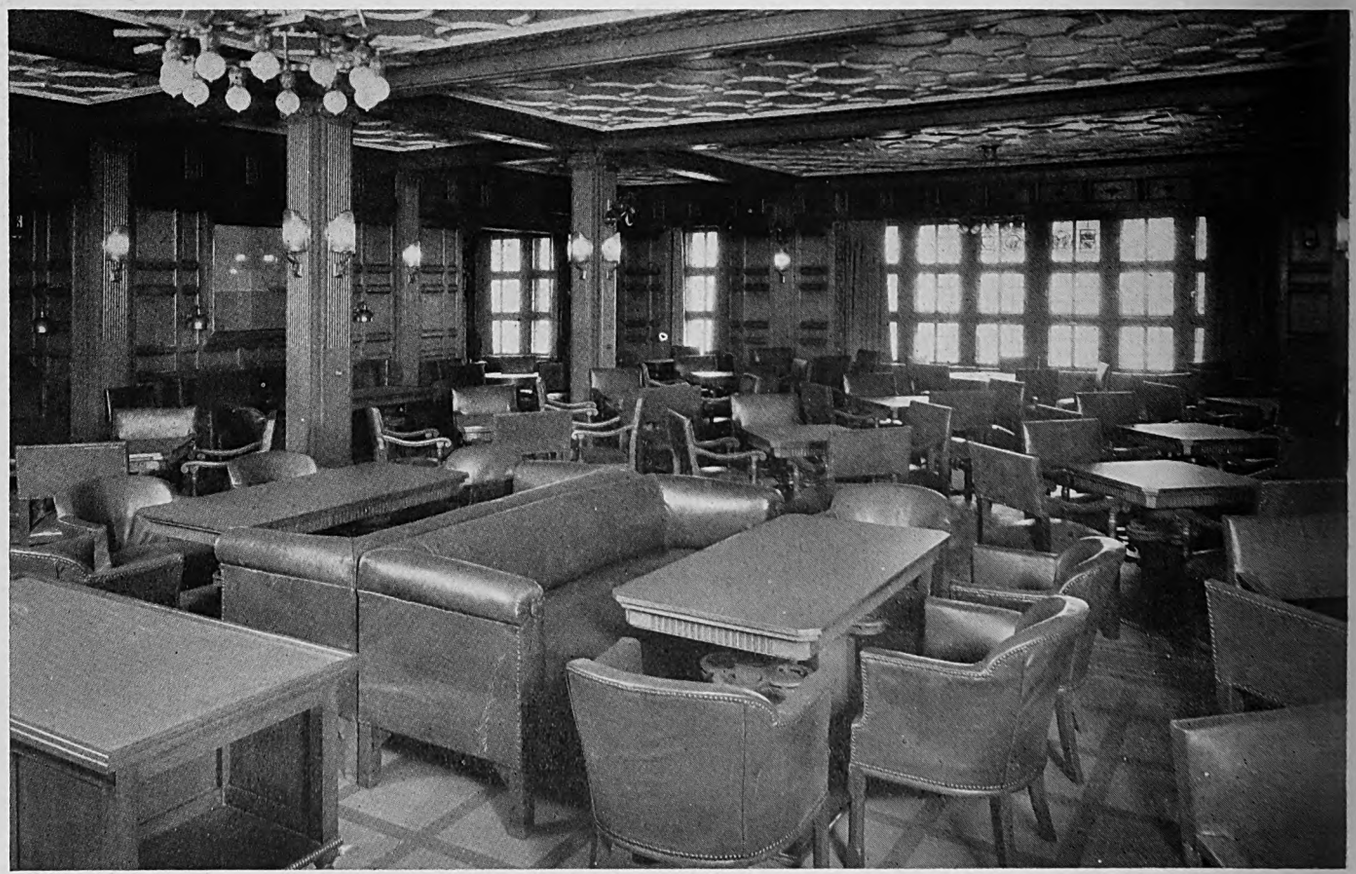
Library



First Class Smoking Room, Looking Forward, Showing Windows Overlooking Forward Deck of Vessel

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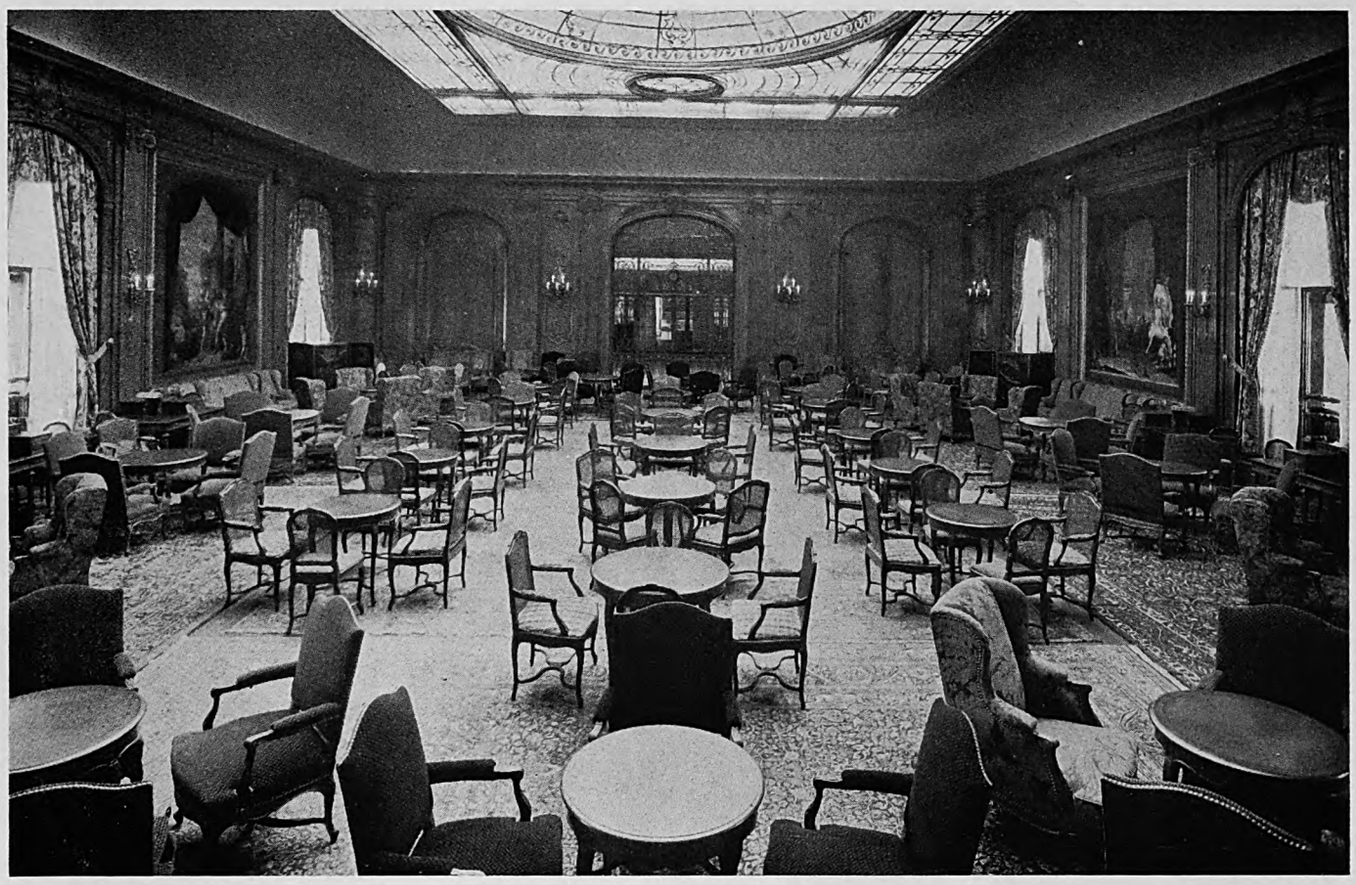

Main Social Hall, Looking Aft

Forward End of Social Hall, Showing Stage

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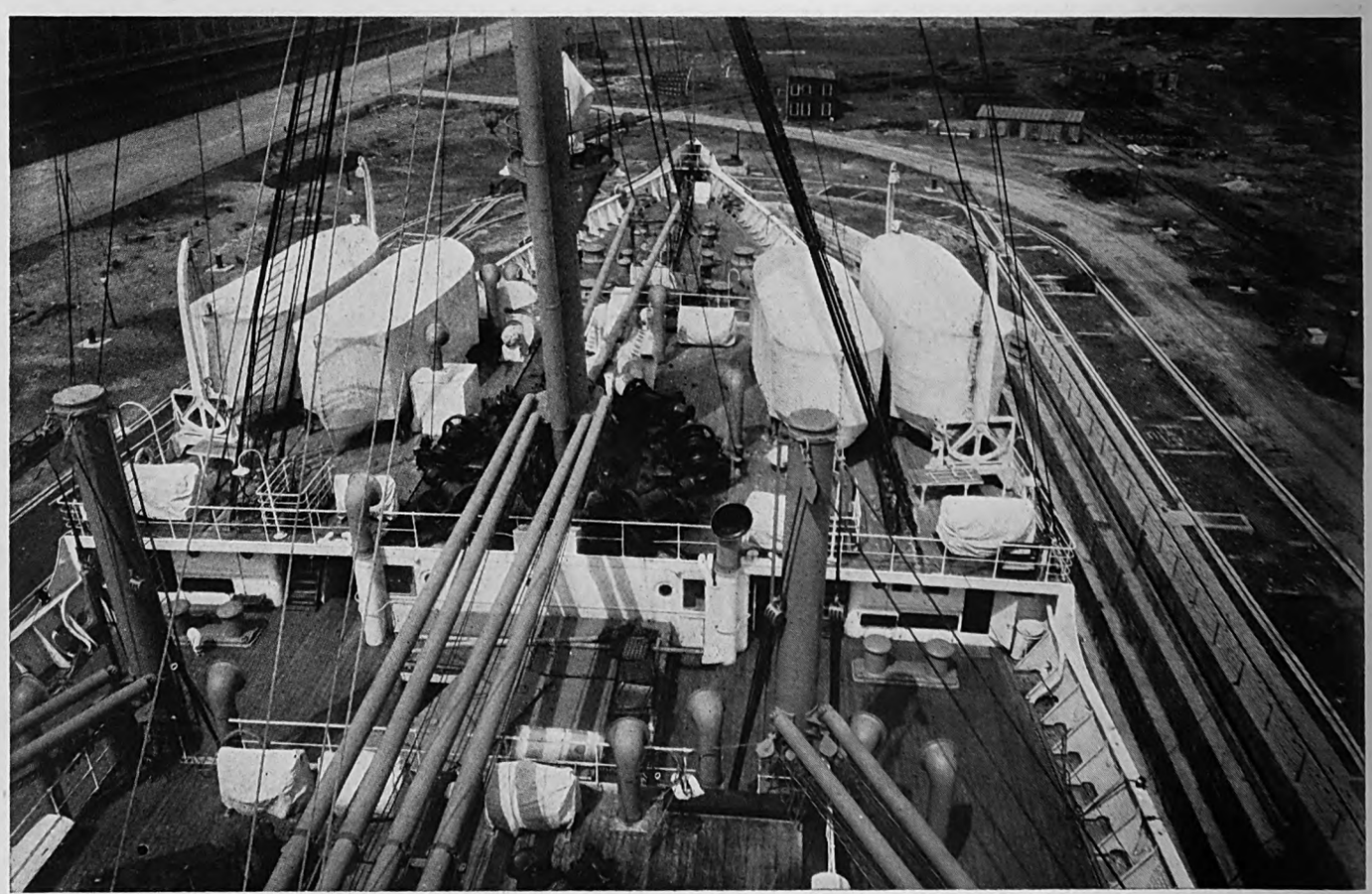
Promenade Deck



Looking Forward from the First Class Smoking Room

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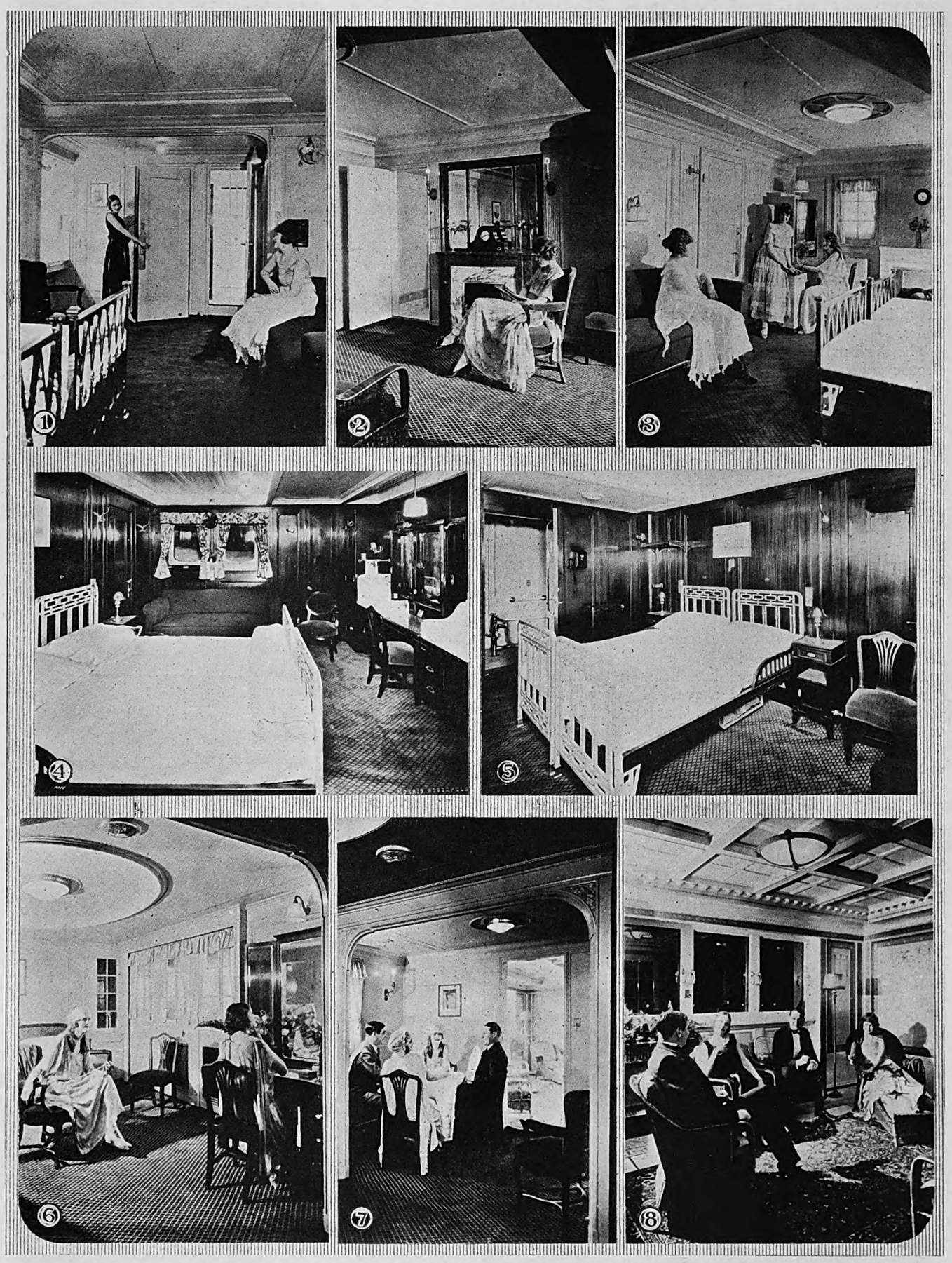

S. S. Leviathan: (1) Bed Room and Bath, de Luxe Suite; (2) Drawing Room, Premier Suite; (3) Bed Room, de Luxe Suite, Looking Outboard; (4) Typical First Class Stateroom, Looking Outboard; (5) First Class Stateroom, Showing Bath; (6) Bed Room, Premier Suite; (7) Breakfast Room, Premier Suite; (8) Sun Parlor, Premier Suite.

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Glass Dome Over First Class Social Hall

and it is only necessary to provide outlet receptacles on the floors or pantries so that these tables may be plugged in like an ordinary portable lamp. In all there are forty of these tables.

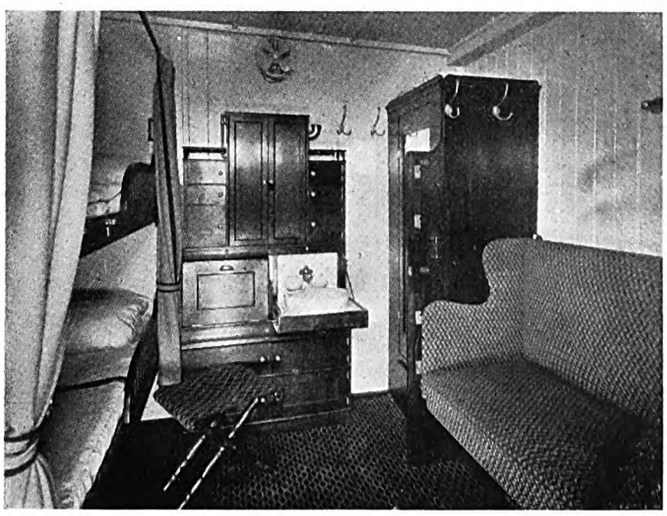
The third part of the electrification was to install as many electric galley ranges in place of the original coal burning equipment as the capacity of the electrical generators would permit. The most difficult place to handle coal and ashes is in the Ritz-Carlton galley on *B* deck, and the electrical capacity was available to completely equip this galley with six 4-foot electrical hotel type sections, together with two broilers and the small bake oven, previously mentioned.

The rest of the galleys are coal burning with the exception of one oil-burning range in the crew's galley.

Bake Ovens

The electric bake oven was among the first electric cooking appliances to be installed on shipboard. Space limitations, developments and the desire for a bakery location that would exclude the use of fuel ovens has promoted the use of electrical equipment. These ovens are of the so-called deck type, having three horizontal tile backs placed one above the other which are heated by independently controlled heating units placed above and below the decks so that uniform heating of the deck is assured and a convenient variation of the temperature of the decks is permitted.

The oven body is of steel, heavily insulated with heat resisting material so that the outside wall temperature rises but little. The switchboard is placed on one side of the oven and has large indicating switches fully protected against dirt and damage. Separate electrical fuses are provided for each heating circuit. Electric lights are provided for the inspection of the bread. It is also furnished with a steam coil attachment for crust baking. This oven is the Edison No. 300; it has a capacity of 25 kilowatts and will hold approximately 200 pounds of bread at a time.



Second Class Stateroom

Electric Galley Ranges

The electric ranges in the Ritz-Carlton galley are in sections 4 feet long and each section has a top cooking surface composed of four 9 by 24-inch cast plates into which has been cast a steel encased "nichrome" heating element, so that the plate and heating unit are inseparable and practically indestructible. Each plate has an input of 4,000 watts and is controlled by a separate switch. These top plates will come rapidly to cooking temperature and can be maintained at a bright red heat. They will not warp or distort and have the decided advantage of a uniformly heated, solid top. Each section has an oven below the cooking top 18 inches high by 21½ inches wide by 28½ inches deep. This oven is well insulated to hold the heat and has two heating elements, one at the top and one at the bottom, so that the operator has complete control of the amount and direction of the heat. These ovens will easily hold 100 pounds of beef in one cut and are very well known for their excellent results in baking and roasting due to the uniformity of the heat and its control. There are six of these sections placed in two rows of three each, back to back.

Electric Broilers

The work of broiling is provided for in a separate room where charcoal broilers are installed. As an adjunct to this service, there are two electrical broilers installed. These are of the horizontal type, having a heating area 16 inches wide by 26 inches deep, adjustable griddle and snaps to control the heating element.

Miscellaneous Devices

There are many other smaller electrical devices installed in the serving pantries and dining room, giving the steward the equivalent advantage of what might be called "gas service" in land installations. It is impossible to get this type of service on shipboard without the use of electricity as these small devices would not be practical with coal fuel. These give the stewards ready and convenient sources of heat for heating operations between meal times and as an adjunct to the service from the galley.

Another important function is the plate warmer in the dining saloon, previously mentioned. These consist of a nicely finished serving table to conform with the dining room architecture and furnishings, having recesses in their tops into which is placed a rectangular steel plate having an electrical heating element on its lower side.

Oil Burning Equipment

The contract for the oil burning equipment for the *Leviathan* was awarded to the Peabody Engineering Corporation of New York. While not representing so large a proportion of actual material required, the vital importance of the oil burners to the success of the vessel will be recognized by all. In fact, it represents the most important single item in the entire reconditioning of the vessel.

The selection of this equipment involved the matter of ability of the burners to meet the specified requirements of the Shipping Board as to capacity and efficiency in the use of the fuel, which provided that one ton of the most viscous oil obtainable must be economically burned per hour under each boiler. Also it was necessary to consider the adaptability of the burners to the special furnaces of the German-built boilers, particularly as applied to the distribution of the gases of combustion to insure economy, and to prevent local overheating and impingement of the flame on the boiler tubes and brick work.

Mr. Ernest H. Peabody, the inventor of the burner, has not only had a wide experience in burning oil fuel under many types of boilers, and under a very great variety of conditions, but is a recognized authority on marine boilers, particularly those of the watertube construction, and furthermore, he had had some special experience with a type of

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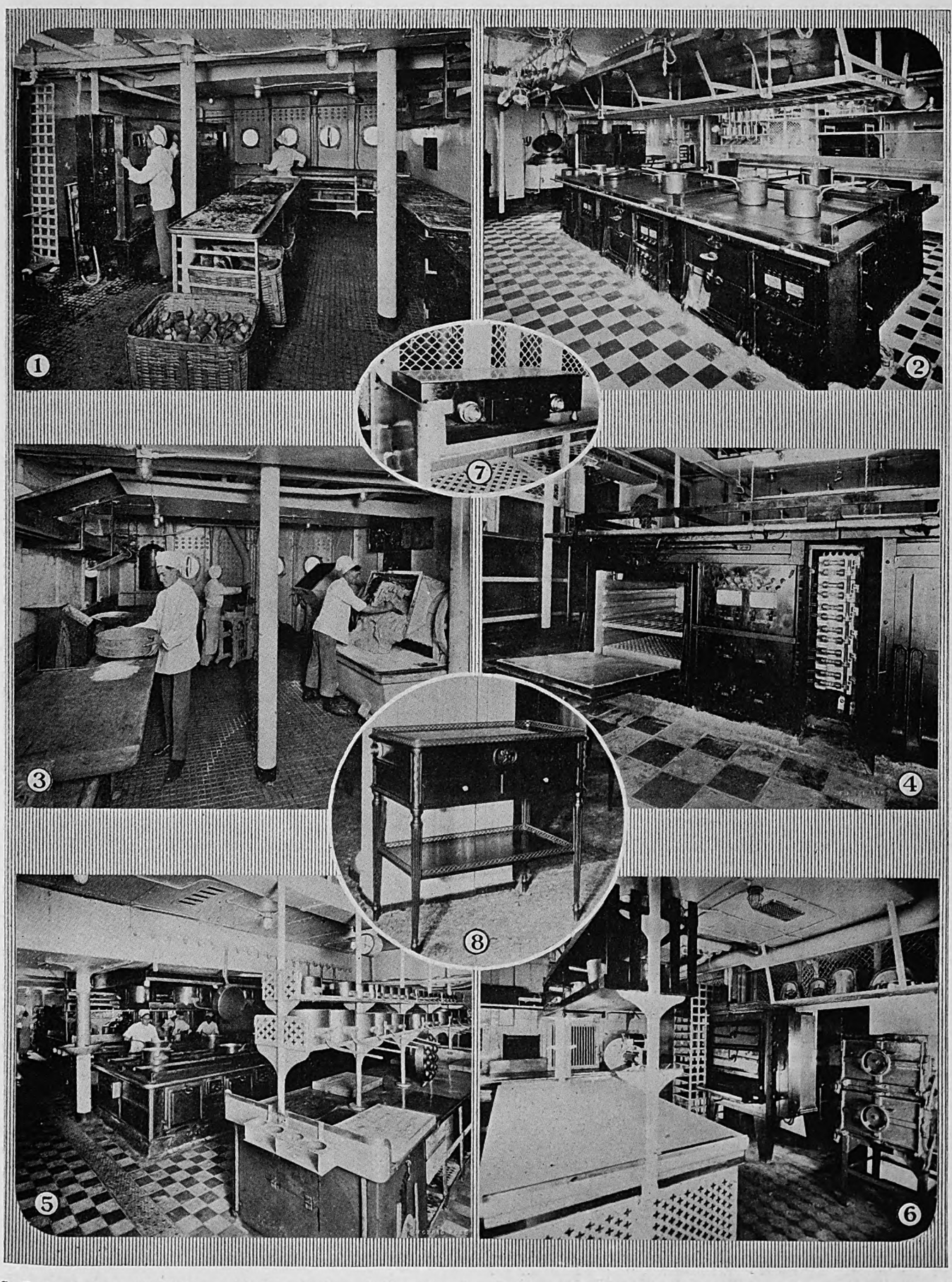

S. S. Leviathan: (1) Bakery, (2) Ritz-Carlton Galley, Showing Electric Ranges, (3) Dough Mixing Room, (4) Detail of Electric Range, (5) First Class Galley, (6) Pastry Bakery, (7) Electric Griddle, (8) Electric Heated Serving Table.

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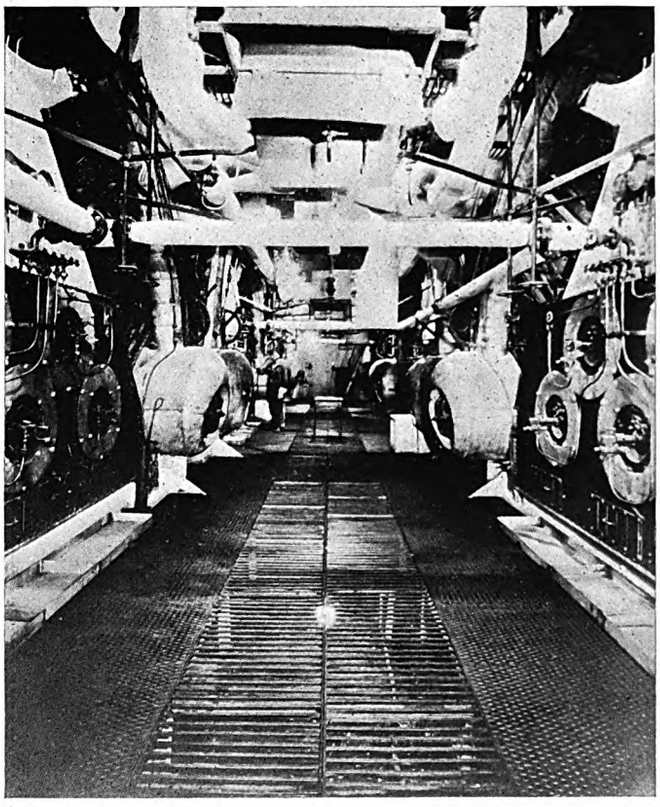
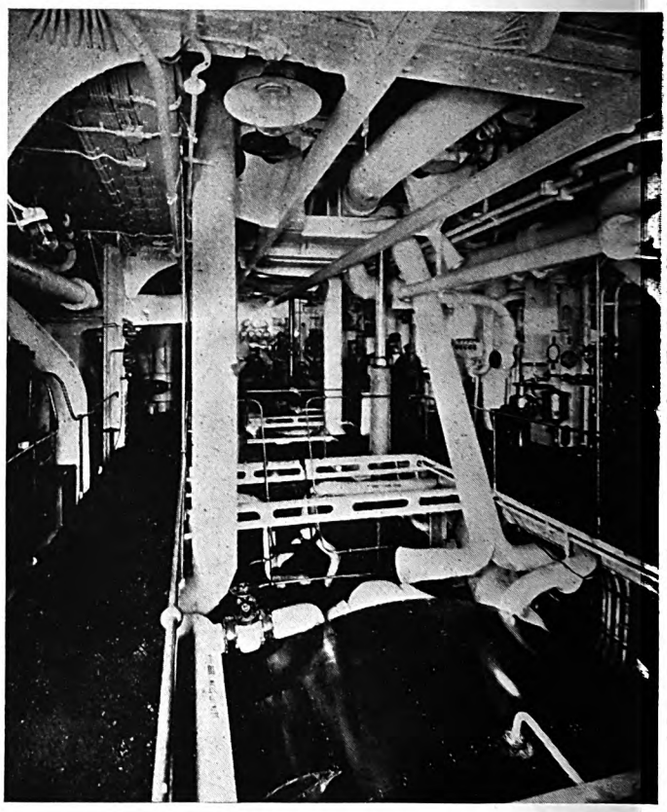
boiler very similar to that installed on the *Leviathan.* It is interesting to note, therefore, in connection with the *Leviathan* contract, that Mr. Peabody was personally consulted in the matter of the details of installation of the furnace walls, selection of the proper refractory materials and general design of the furnaces.

The equipment consists of 230 Peabody mechanical atomizing burners and air registers, five units being installed on each of the 46 boilers. The air for combustion is delivered to the fire room by means of blowers operating under very slight pressure head. The air then passes through specially constructed air heaters arranged in the uptakes of the boilers, thus utilizing a portion of the waste heat from the gases in heating the air for combustion on its passage to the burner.



General View of One of the Boiler Rooms



General View of the Engine Room

After leaving the heaters the air flows through a double casing to the front and rear of the boilers, that portion which passes to the front flowing directly to the air registers, and that passing to the rear being conducted under the furnace floors through ducts, which communicate with the air box or double front on the boilers in which are located the air registers which control and deliver the air to the burners.

It will be evident, therefore, that not only is waste heat recovered from the escaping gases for combustion, but the boiler casing, including that beneath the furnace floor, is cooled by the passage of the air, and the radiation of heat into the boiler room is greatly reduced. The trials of the vessel have, in fact, demonstrated that the fire rooms of this vessel are very comfortable even under the semi-tropical weather conditions prevailing during the trial trip.

It will be noted in this connection, that this method of utilizing draft is much cooler than would be the case if the air were delivered through ducts directly to the air heaters, for the reason that all the air for combustion goes through the fire rooms and acts as a ventilating medium for the fire rooms.

Under ordinary steaming conditions the fire rooms of the vessel will not be closed and the air pressure will be practically equivalent to that of the atmosphere. The work of drawing the air through the heaters and casings and delivering same to the air registers and thence to the burners, and also of drawing the escaping gases through the boilers into the uptakes, is therefore accomplished by the natural draft suction of the vessel's funnels, which are about 170 feet in height above the burners. Under forced conditions, the fire rooms may be closed and the air pressure raised to about one-half inch water pressure, or just about sufficient to overcome the resistance offered by the air heaters and double casings of the boiler.

The Peabody air register is well known for its simple construction, ease of regulating and controlling the air for combustion and low resistance to the flow of air through same. The air control doors are arranged to form the surface of the frustum of a cone when in the closed position, and, when opened, will give the air a rotary motion as it passes to the burners. Owing to the fact that the air doors are adjacent to each other without the use of intermediate members or "door jambs," the entire surface of the cone is available for the entrance of the air, barring the very small resistance offered by the hinge bolts.

The operating gear consists of a hand wheel and lock nut communicating with a rack and pinion on the inside of the front plate of the register, which operates all doors simultaneously and holds them in a fixed position. A suitable inspection and lighting hole is provided directly above the burners, together with two additional openings which can be used for giving access for cleaning.

The burner is supported on a bracket in the center of the front plate of the register which carries a tube through which the burner is inserted when in operating condition. Quick, detachable yoke couplings serve to connect the burners to the oil delivery lines, and the yoke is so arranged that when the burner is removed, the carefully machined surface

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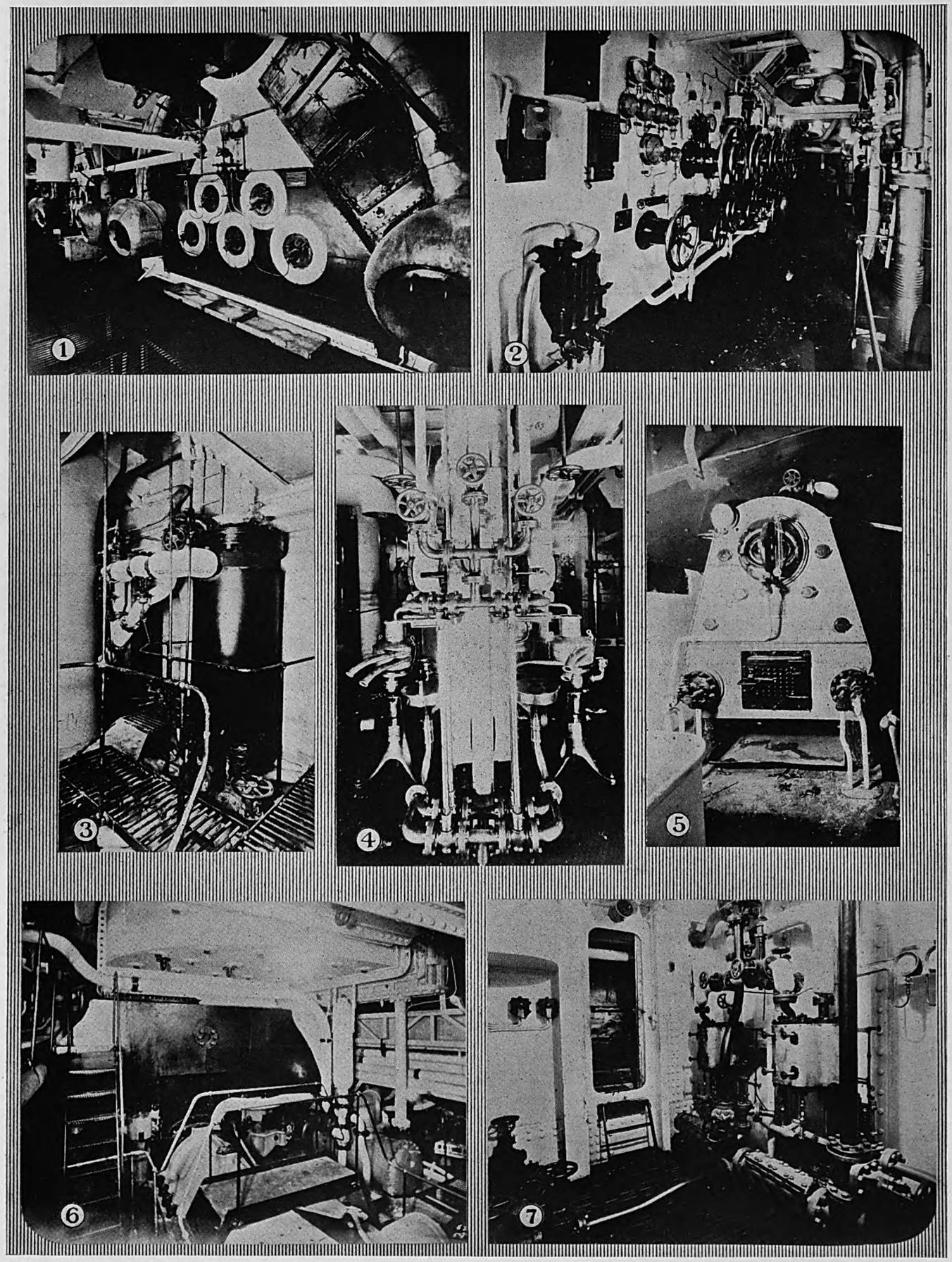

S. S. Leviathan: (1) One of the 46 Boilers, Showing Fuel Oil Burners; (2) Operating Platform; (3) Fuel Oil Heaters; (4) Lubricating Oil Manifold and Separators; (5) New Donkey Boiler; (6) Looking Forward at Aft End of Port Low Pressure Turbine; (7) Fuel Oil Service Pumps in No. 4 Fireroom, Showing Pump Governor, Quick Closing Throttle Valves and Suction Strainers.

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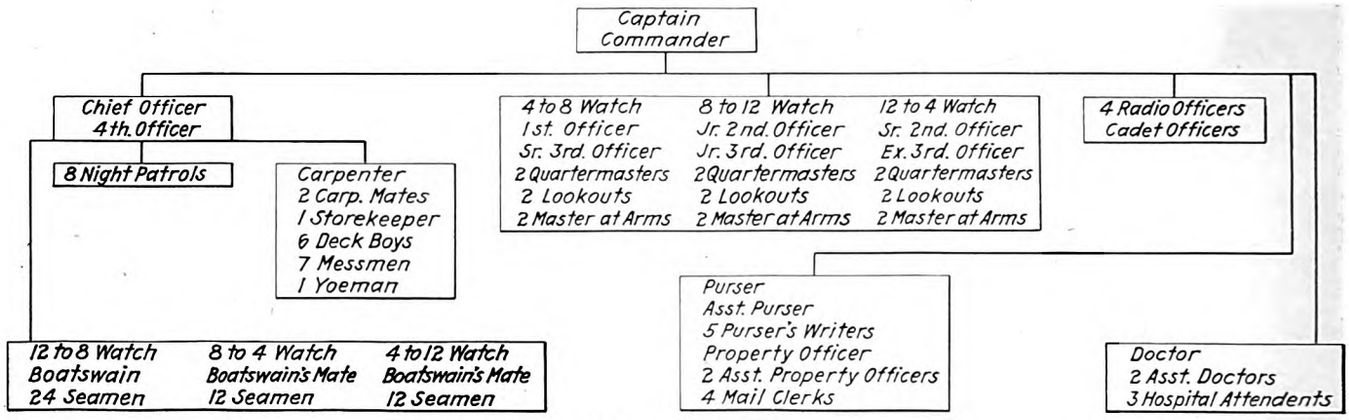
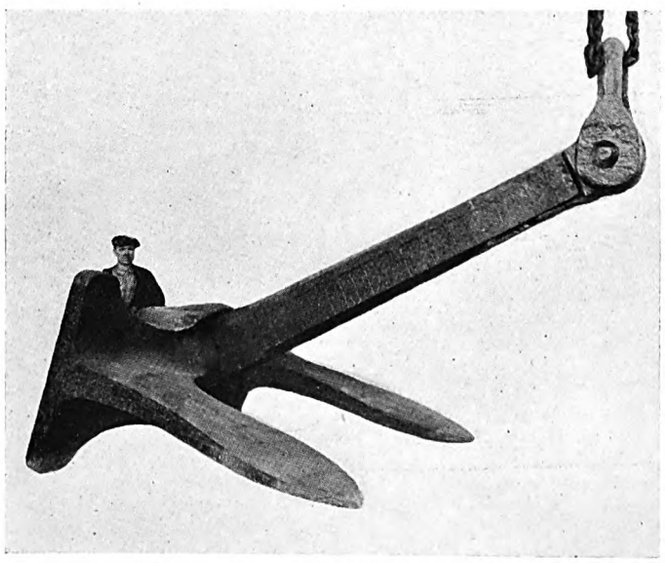


Leviathan Deck Department Organization Chart

of the coupling is protected from damage. These yoke couplings are all interchangeable so that any burner can be installed in any air register at a moment's notice.

Like all mechanical burners, the atomization is accomplished by centrifugal force induced by delivering the oil tangentially to a central chamber at the tip of the burner. In the Peabody design, the tangential passages and the outlet orifice, together with the central chamber, are contained in one very carefully machined member which is easily removed and replaced when it is desired to change the size of the burner, or when it is necessary to clean out any extraneous matter which may pass the strainers and reach the burner tips.

Readers of this article will perhaps be interested to know that the "wide range" feature which is usually furnished with the mechanical burners manufactured by the Peabody Company was not supplied with the burners installed on the *Leviathan*. Thus, in the selection of the burner, the added advantage of the wide range feature played no part, and the burner and air register were approved on their merits as a "straight" mechanical burner equipment. It is believed by the manufacturers of the burner that the wide range feature could be added with little additional cost, resulting in a considerable reduction in the fire room force and added efficiency in operation.



The Largest Anchor in the World

The largest anchor in the world was recently completed at the Thurlow Works of the American Steel Foundries at Chester, Pa., for the S. S. Leviathan, reconditioned at the Newport News Shipbuilding and Dry Dock Company, Newport News, Va. The anchor is of cast steel, of the Dunn stockless type and weighs 33,300 pounds.

The commanding officers of the *Leviathan* and the personnel of the engine room staff are as follows:

List of Deck Officers

Herbert Hartley, captain.
Hubbard C. Fish, staff commander.
Kenneth B. Lowry, chief officer.
Joseph P. Linden, first officer.
Ephraim W. Higgins, second officer.
Harry Manning, second officer.
Louis M. Sanders, third officer.
John S. Bowen, third officer.
Gordon F. Danforth, third officer.
Walter E. Burns, fourth officer.
Three cadet officers.

List of Licensed Engineers

Chief: Robert L. Harrison.
Staff Chiefs: John J. Fagan, Robert Douglas, William Lundy.
First Assistants: Burton L. Cartmel, Charles W. Isgar, David H. Betts.
Second Assistants: E. L. Dawson, M. P. Iverson, Marshall Cowell.
Senior Thirds (18): E. J. Deeds, E. J. Landers, James Senlle, George L. Clow, G. H. Begley, G. C. Merry, L. L. Szatkowski, A. R. Brebner, W. M. O'Connor, A. H. Claudius, M. T. Minnihan, W. J. Brockie, A. Schlexer, F. H. Kipper, Thomas Webster, A. M. Davis, H. J. Williamson, C. Hunt.
Junior Thirds (16): J. W. Thomas, W. R. Fernald, W. J. Smith, E. L. Powell, J. F. Halle, C. C. Clark, W. G. Hawkins, C. H. S. Hallett, F. B. Mulroy, J. T. Olson, J. A. Smith, W. B. Schaum, J. E. Bacorn, J. A. Hanna, F. J. Sholl, H. G. Thompson.
Hydraulic Engineers: W. E. Wallace, D. Coogan, T. H. Bowker.
Deck Engineers: J. L. Moore, E. L. Moritz, F. Lewis.
Fourth Assistant Engineers: E. F. Sawyer, E. J. Thawley, G. C. Tucker.
Refrigerating Engineers: G. W. Bailes, Thomas Egan, H. Franklin.
Electricians: R. J. Cross, J. R. Dale, A. F. Neely.
Assistant Electricians: E. H. Quoos, T. E. Brown, A. J. Cann, W. F. James, J. C. Howard, T. Anderson, J. J. Elan, C. G. Snowden, H. R. Macy.
Sanitary Engineers: A. G. McCarthy, James Sheridan, A. W. Thomas, J. H. Garris, J. E. Johnson, J. J. Maynard.
Boiler Makers: S. Crawford, J. Boyle.

Motorship Launched at Bristol.—Messrs. Chas. Hill and Sons, Albion Dockyard, have just launched the third of the ocean-going motor vessels that have been built in Bristol. The other two were the British India Steam Navigation Company's passenger and cargo ships *Dumra* and *Dwarka*. The new vessel, the *Margretian*, is the largest of the three and is only 15 feet shorter than the largest vessel ever launched in Bristol. Her dimensions are: Length, 310 feet; breadth, 43 feet 6 inches; depth, 26 feet. She will be fitted with two internal combustion engines and twin screws. Her gross tonnage is about 2,800. The vessel has been built to the order of Messrs. Owen and Watkins Williams & Company, Cardiff, proprietors of the Golden Cross Line, having a regular service between Bristol and the Mediterranean in the general cargo and fruit trade.

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Marine Standards Committee Ready for Action

Constitution and Rules of Organization Adopted—Method of Developing Standards Outlined — Members of Technical Committees Appointed

THE constitution and rules of organization and procedure under which simplification and standardization in the shipping industry will be carried out have been completed. At a recent meeting in New York of the executive board of the American Marine Standards Committee, every provision was made for carrying out in detail the important work in all branches of the field. Great credit is due Secretary Hoover, of the Department of Commerce, for starting and sponsoring this movement in every industry in his campaign on the "Avoidance of Waste." Many branches of the manufacturing industry have started this work and it is particularly gratifying that shipping, in which maximum efficiency is an absolute necessity, has succeeded, largely through the efforts of Colonel E. A. Simmons, president of the American Marine Association, in enlisting the services and cooperation of our most prominent naval architects, marine engineers and ship operators.

To the Shipbuilders, Manufacturers of Appliances and Supplies for Marine Use and the Ship Operators of the United States

June 13, 1923.

Gentlemen:

The American Marine Standards Committee, created by the shipbuilders and manufacturers of appliances and supplies for marine use for the purpose of erecting standards and securing simplifications in many elements of ship construction, etc., promises to be of very great importance to the industry.

The Department of Commerce has placed at the disposal of the Committee the services of its Division of Simplified Practice and the Departmental laboratories for the development of such standards and simplifications as the Committee may think wise to recommend to the industry.

The results obtained in other industries by movements of this character originating from the industries themselves have been of the most important character and all contribute to overcome the natural handicaps in which we are placed in international competition.

I am glad that the Department should be able to co-operate with the industry in this movement and I believe the support of the Committee by the industry itself will bring important results to the manufacturers and shipowners.

Yours faithfully,
(Signed) HERBERT HOOVER.

Without the cooperation of the best men in the field, the movement would have no chance of success. This was fully realized and great care was taken in preparing the constitution and rules to prevent the possibility of any standard being adopted that had not received the most careful and authoritative consideration.

How Standards Will Be Developed

In order to do this, the executive board has divided the work among five technical committees which in turn will appoint subject committees for specific items. When a standard has been developed as far as the tentative stage by a subject committee, it then goes to the technical committee under which it is working, and, if passed by that body, it will then be forwarded to the secretary. The secretary will then promptly submit an outline of the standard to all concerns interested and invite their comments. The proposed standards, together with such comments as come in in a reasonable time, will be submitted by the secretary to the executive board. The board may order future study and send it back to its technical committee with comments or it may do one of three things, namely:

1. The board may, by a favorable majority vote of all its members, approve it as *Suggested American Marine Practice,* or
2. It may, by a favorable two-thirds vote of all its members, approve it as a *Tentative American Marine Standard,* or
3. It may, by a favorable three-fourths vote of all its members approve it as an *American Marine Standard.*

The votes of the executive board upon any proposed standard will be obtained by ballot.

Requirements for Membership

Having shown how standards will be developed, it is appropriate to explain how individuals, companies, societies, government departments, and all either directly or indirectly concerned, can secure membership and take part in the work of the organization. The mass membership is composed of individuals, partnerships, corporations, societies, Government departments, public bodies, etc.

It will be noted that the mass membership is divided into two divisions, those who contribute funds or direct service and those who only cooperate in technical work. From these two classes of member bodies there is drawn the representative membership from and by which the members of the executive board will be taken and elected.

The Executive Board

The present executive board, every member of which is widely known, is constituted as follows:

Colonel E. A. Simmons, president, American Marine Association, 30 Church Street, New York City, representing the American Marine Association, chairman; Captain R. D. Gatewood, U. S. N., manager, Department of Maintenance and Repair, United States Shipping Board Emergency Fleet Corporation, 45 Broadway, New York City, representing the U. S. Shipping Board, vice-chairman; Charles F. Bailey, engineering director, Newport News Shipbuilding & Dry Dock Company, Newport News, Va., representing shipbuilders for engineering details; Hugo P. Frear, naval architect, Bethlehem Shipbuilding Corporation, Limited, Bethlehem, Pa., representing shipbuilders for hulls and fittings, also the Atlantic Coast shipbuilders' Association; E. H. Rigg, naval architect, New York Shipbuilding Corporation, Camden, N. J., representing the Society of Naval Architects and Marine Engineers; William Francis Gibbs, president, Gibbs Brothers, Incorporated, 1 Broadway, New York City, representing the American Steamship Owners' Association; Captain C. A. McAllister, vice-president, American Bureau of Shipping, 50 Broad street, New York City, representing the American Bureau of Shipping; Captain John F. Milliken, secretary and treasurer, Neptune Association, 21 Pearl Street, New York City, representing masters, mates and labor organizations; Rear Admiral J. D. Beuret, U. S. N., chief of Bureau of Construction and Repair, Navy Department, Washington, D. C., representing the Bureau of Construction and Repair, Navy Department (alternate member, Rear Admiral Robert Stocker (C. C.), U. S. N., Bureau of Construction and Repair, Navy Department, Washington, D. C.); Admiral J. K. Robison, U. S. N., chief of the Bureau of Engineering, Navy Department, Washington, D. C., representing the Bureau of Engineering, Navy Department (alternate member, Captain J. T. Tompkins, U. S. N., Bureau of Engineering, Navy Department, Washington, D. C.); Brigadier General H. Taylor, U. S. A., Corps of Engineers, United States Army, War Department, Washington, D. C., repre-

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senting the Corps of Engineers, U. S. A.; General George Uhler, supervising inspector general, United States Steamboat Inspection Service, United States Department of Commerce, Commerce Building, Washington, D. C., representing the U. S. Steamboat Inspection Service; John W. Gray, assistant to general manager, Newport News Shipbuilding & Dry Dock Company, Room 410, Harrison Building, Philadelphia, Pa., representing the American Society of Mechanical Engineers (alternate member, H. H. Brown, managing editor, MARINE ENGINEERING AND SHIPPING AGE, 30 Church street, New York City).

The Technical Committees that have been appointed to supervise simplification and standardization are as follows:

COMMITTEE ON HULL DETAILS

W. A. Dobson, naval architect, William Cramp & Sons' Ship and Engine Building Company, Philadelphia, Pa., chairman; E. L. Stewart, naval architect, Standard Oil Company of New Jersey, 26 Broadway, New York City; W. R. Bean, assistant naval architect, New York Shipbuilding Corporation, Camden, N. J.; A. B. Brown, naval architect, Sparrows Point Plant, Bethlehem Shipbuilding Corporation, Sparrows Point, Md.; J. W. Hudson, naval architect, Sun Shipbuilding Company, Chester, Pa.; H. F. Norton, naval architect, Newport News Shipbuilding & Dry Dock Company, Newport News, Va.; Axel Rossell, chief constructor, Gibbs Brothers, Incorporated, 1 Broadway, New York City; Commander H. S. Howard (C. C.), U. S. N., in charge of new design, Bureau of Construction and Repair, United States Navy Department, Washington, D. C.; Horace H. Thayer, consulting naval architect, 119 South 4th street, Philadelphia, Pa.; Hugo P. Frear, naval architect, Bethlehem Shipbuilding Corporation, Limited, Bethlehem, Pa.

COMMITTEE ON ENGINEERING DETAILS

A. A. Howitz, chief engineer, Sun Shipbuilding Company, Chester, Pa., chairman; Charles P. Wetherbee, vice-president, Bath Iron Works, Limited, Bath, Me.; M. L. Katzenstein, manager, Marine Department, Worthington Pump & Machinery Corporation, 115 Broadway, New York City; W. W. Smith, chief engineer, Federal Shipbuilding Company, Kearny, N. J.; J. B. Crew, chief engineer, New York Shipbuilding Corporation, Camden, N. J.; R. Warriner, chief engineer, Bethlehem Shipbuilding Corporation, Ltd., Quincy, Mass.; James S. Milne, chief engineer, Todd Shipyards Corporation, 25 Broadway, New York City; John F. Metten, chief engineer, William Cramp & Sons' Ship & Engine Building Company, Philadelphia. Pa.; Commander S. M. Robinson, U. S. N., head of design division, Bureau of Engineering, U. S. Navy Department, Washington, D. C.; Charles F. Bailey, engineering director, Newport News Shipbuilding & Dry Dock Company, Newport News, Va.; A. E. Ballin, president, McIntosh & Seymour Corporation, Auburn, N. Y.; A. B. Homer, marine engineer, Bethlehem Shipbuilding Corporation, Ltd., Bethlehem, Pa.

COMMITTEE FOR SHIP OPERATION, DETAILS AND SUPPLIES

A. S. Hebble, superintending engineer, Southern Pacific Lines, Pier 49, North River, New York City, chairman; R. F. Hand, assistant manager, marine department, Standard Oil Company of New Jersey, 26 Broadway, New York City; Walter L. Green, Jr., superintending engineer, Luckenbach Steamship Company, 44 Whitehall street, New York City; H. M. Wesson, superintending engineer, United American Lines, Inc., 39 Broadway, New York City; W. B. Ferguson, superintendent of construction, Newport News Shipbuilding & Dry Dock Company, Newport News, Va.; N. J. Pluymert, marine superintendent, Standard Transport Company, 26 Broadway, New York City; P. H. Harwood, marine manager, Pan American Petroleum & Transportation Company, 120 Broadway, New York City; George B. Drake, manager, marine department, Texas Company, 17 Battery Place, New York City; Captain Henry M. Seely, supervising inspector, second district, U. S. Steamboat Inspection Service, Custom House, New York City; John W. Gray, assistant to general manager, Newport News Shipbuilding & Dry Dock Company, Room 410, Harrison Building, Philadelphia, Pa.; H. C. Higgins, district agent, division of operations, U. S. Shipping Board Emergency Fleet Corporation, Philadelphia, Pa.; Captain H. L. Wyman, U. S. N., assistant to chief of Bureau of Engineering, Navy Department, Washington, D. C.; L. B. Shuman, principal assistant engineer, U. S. District Engineer's Office, Witherspoon Building, 1321 Walnut street, Philadelphia, Pa.

Two other committees are yet to be appointed; namely, the committee on port facilities and that on manufacture and construction.

The secretary of the organization is Mr. A. V. Bouillon, Division of Simplified Practice, Department of Commerce, Washington, D. C.

A special committee was appointed at the recent meeting of the board with power to designate specific subjects to be taken up by the technical and their subject committees.

Leviathan on Trial Trip Breaks World Records

(*Continued from page* 393)

before, during and after the reconditioning were shown and addresses were made by Mr. Lasker, Mr. Gibbs, Mr. Ferguson and by Edward Price Bell on behalf of the newspaper correspondents. In these addresses it was shown that the work of reconditioning, including the trial trip, has been done within the appropriation of $8,200,000 made on estimates of two years ago, that the contracts were performed without extras and that the trial trip, which had been criticised in some quarters, had been made within the estimated cost of $120,000. Mr. Lasker stated that the Newport News Shipbuilding and Dry Dock Company had suffered a loss of $1,200,000 in its part of the contract, which amounted to $6,100,000, partly because while the bids were made during a time of unemployment, the work was completed in a time when there was a great demand for labor. He expressed great appreciation of the character of the work done and the degree of cooperation shown by the Newport News company and said that to reproduce the vessel in its present condition would cost $25,000,000.

TRIAL TRIP NECESSARY

Mr. Ferguson also expressed appreciation of the attitude shown by Mr. Lasker and the Shipping Board in backing up the recommendations of the experts without the interference that sometimes characterizes Government work.

As demonstrating the necessity for a trial trip, which had been denied by some critics of the board on the ground that it was only a junket, it was shown that before all the detailed functions pertaining to the operation and service of the vessel could be expected to be performed with the smoothness desired of the greatest ship in the world time would be required to give the men an opportunity to work together and develop a thorough team work; also that the ship had not been run under full power before because its bottom had not been cleaned for 3½ years and that during the slow speed trip from Newport News to the drydock at Boston a cracked propeller hub had been discovered which would have resulted in excessive strain in the shafting and might have caused considerable damage if an attempt had then been made at high speed. There is also a large number of underwater valves which had to be overhauled in drydock. Mr. Ferguson said it was highly complimentary to his company to suggest that the ship did not need a trial but that for the Government to accept it without one would hardly have indicated prudence and that his company could not afford to conduct the trial itself because it was impossible to fully insure so large a ship.

Mr. Lasker said that although it had been almost kept a secret even from him, the attaining of the world speed record was one of the objects Mr. Gibbs had had before him all the time and Mr. Lasker and Mr. Ferguson both emphasized the need for an American merchant marine and the impetus that would be given toward it by the successful completion of the new *Leviathan*.

Mr. Lasker also said that while he did not believe in Government operation and while he had had "fifty years of hell in two winters" as a Government official, apparently the President and the Shipping Board now have no alternative to direct Government operation of the Shipping Board fleet and that if we cannot have a merchant marine in any other way he is willing to have it under conditions which he does not like.

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Tests of the machinery and equipment were conducted by a trial board consisting of Captain R. D. Gatewood, chairman, Harry Brown, J. F. Metten, A. S. Hebble, J. E. Bailey, Captain W. E. Griffith, Captain C. A. McAllister and C. A. Greaser, secretary. All trial data in connection with the main machinery and engine room auxiliaries, including auxiliary lighting equipment, were obtained for the agent under the direction of Henry C. E. Meyer, chief engineer. All other trial data, including all hull engineering, passenger equipment, galley and pantries, etc., were obtained under the direction of Axel Rossell, chief constructor, and G. A. Anthony, assistant chief constructor.

TESTS

Among the tests made in addition to the obtaining of engine room trial data were:

500 kilowatt geared turbo generator was tested for one hour carrying full service load, exhausting against back pressure, exhaust being used in feed heaters or bled to main low pressure turbines as required in service. Other machines were operated in parallel electrically, exhausting to common auxiliary exhaust.

Lifeboat tests.

Test of hydraulically operated watertight doors controlled from bridge.

Test of Rich fire detecting and extinguishing system covering the cargo holds, fore and aft. Smoke was produced first in the forward hold, later in the after hold. The detection cabinet determined the location of the smoke and steam was turned on momentarily to see that it is in operating condition.

Test of new 2 kilowatt vacuum tube radio telephone.

Test of whistles, siren and engine order telegraphs.

Test of steering telegraph and anchor telegraph.

Test of deep sea sounding machine.

Test of new Sperry 450,000,000 beam candlepower searchlight.

Test of emergency lighting (storage batteries).

Test of the various ventilation systems, 257 in number, operated at full power.

Test of new 6 kilowatt vacuum tube radio telegraph.

Test of pneumatic draft gages.

Test of manually operated stand-by engine.

Hour test of electrically operated fog bell.

Test of Kent clear view screens.

Test of aero automatic fire alarm from different circuits throughout the vessel.

Test of manual fire alarm system from different boxes throughout the ship.

Test of salt and fresh water sanitary system.

Gyro compass test including change of master compasses and transfer of repeaters.

Test of annunciator system and loud speaking telephones.

Test of 2 kilowatt radio spark set.

Test and inspection of all culinary apparatus.

Test of submarine signal apparatus.

Test and inspection of elevators and dumbwaiters.

The congressional guests joined in the general enthusiasm over the success of the run and in the praise of the Shipping Board official that had brought it about. Among those who gave expressions of this character to the newspaper men for transmission to their papers by radio were Senator Fletcher of Florida, Senator-elect Edwards of New Jersey, Senator Oddie of Nevada, Representative Madden of Illinois, chairman of the House Appropriations Committee; Representatives Gallivan of Massachusetts, McFadden of Pennsylvania, Bloom of New York, Burton of Ohio and Britten of Illinois. Representative Madden also referred to the guests on the "junket" as "the best behaved and most circumspect crowd I have ever seen" and said he had been convinced of the necessity for a trial trip.

NEW RADIO RECORD

New records were also established during the trial trip for the volume of traffic handled by the radio telegraph system. David Sarnoff, vice-president, and G. H. Porter, general superintendent of the Radio Corporation of America, gave their personal supervision to the handling of the large volume of messages handled, which, largely because of the great amount of newspaper copy sent, was estimated at 15,000 words a day. Mr. Sarnoff said that there were more messages sent and received daily on the ship than are handled every 24 hours between the United States and any European country.

PURSE FOR ENGINE MEN

At an evening entertainment on June 24 the guests on board contributed a fund of $5,932 to be distributed under the direction of Mr. Lasker among the officers and crew of the engine room.

Farmers-Manufacturers Conference at Cincinnati Pledges Support for Merchant Marine Campaign

THE Middle West Farmers-Manufacturers Conference held at Cincinnati, Ohio, on June 28 and 29 has developed the fact that all classes of our people believe that America should have its own merchant marine. There is, however, a difference of opinion as to how this great object can be accomplished but there can be no doubt that the best way to iron out these differences is to get the representatives of commercial, farming and manufacturing organizations together around one table.

Among the speakers who addressed the conference from the standpoint of the shipping industry were E. C. Plummer of the Shipping Board, Winthrop L. Marvin of the American Steamship Owners' Association, N. O. Pedrick of the United States Ship Operators' Association and Frank J. Shipman of the American Marine Association. Mr. Shipman invited the conference to attend the American Marine Congress to be held next November in New York and this invitation upon the motion of Matthew Hale was accepted.

The principal speeches by representatives of the Middle West were made by Senator Pomerene and O. E. Bradfute, president of the American Farm Bureau Federation.

Senator Pomerene said, "Let the chambers of commerce, manufacturers' and farmers' associations study this problem and pass resolutions and then tell their congressmen what they want and it will come to pass. We must never again be in the position that we were when the Great War broke out."

Mr. Bradfute said that it was only recently that the farmers had been invited to sit at the council table in maritime matters. He believed that the farmers would support the merchant marine and declared that there were no class of men more loyal to American institutions. He pointed out that the membership of the organization he represented was composed of over one million farms and that they had a system of obtaining, in a very short time, the concensus of opinion of their membership on any subject through the questionnaire system.

RESOLUTIONS ADOPTED BY MIDDLEWEST FARMERS-MANUFACTURERS CONFERENCE

It is hereby declared to be the purpose of the Middle West Farmers-Manufacturers Conference to develop the foreign trade of the Middle West, through education, conferences and the coordination and co-relation of the various agencies, such as manufacturers' associations, farmers' organizations and chambers of commerce now studying the subject through their several traffic committees, which studies are necessarily either local or related to a single industry, to the end that the Middle West may participate in the foreign trade of the nation to the fullest extent and upon equality of opportunity so far as that is possible.

Our distance from the sea being approximately a thousand miles greater on the average than any nation with which we compete,

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and our own seaboard markets nearer to foreign markets in point of freight costs than much of our own territory, transportation becomes a major purpose of this conference.

The development of seaways that will move the sea base inland, or inland waterways that will furnish routes of low resistance costs to the sea base, are of especial concern to this conference.

We stand unreservedly for an American merchant marine, without subsidy, as an indispensable link in our delivery system. And in the place of subsidy we submit the following as offering a probable solution of the problem and recommend its most careful consideration:

1. A system of preferential customs duties on goods carried in American ships.
2. A system of preferential rail rates for goods and passengers carried in American ships.
3. A system of preferential tonnage dues for American ships.
4. Allowing our railroads to apply export rates on materials used in the construction of American ships and on supplies used therein.
5. Laws compelling American officials traveling at Government expense to use American ships.
6. Laws providing that a certain percentage of our immigrants be carried on American ships.
7. Such other preferences for American ships as may result in benefit to the American shipper and may secure closer cooperation between the American shipper and the American merchant marine.

Our ocean transportation should be thoroughly co-ordinated with our inland transportation system, through the establishment of through joint rail and ocean freight and passenger rates from the Middle West to foreign markets. In this way only can the shipper in the interior know the actual cost of his goods delivered in those markets.

Our shippers of the interior should be allowed to file their export declarations at the custom houses of the cities where shipments originate.

We emphatically urge the Shipping Board to postpone any radical change of policy until Congress convenes and until the people of the country have an opportunity to express their views regarding additional merchant marine legislation. And we urge the Shipping Board in the meantime to work our some plan of operation through private steamship companies, fair to the Government, shippers and to the companies, which will enable those companies to buy the ships as soon as shipping conditions permit and as soon as additonal legislation is secured.

We further recommend the following resolutions:

BE IT RESOLVED, that, we favor an equalization of export rail rates to all ports from the Middle West, and of import rail rates from all ports to the Middle West, to secure additional outlets to the sea and to make all of our seaports available to the Middle West on equal terms.

BE IT FURTHER RESOLVED, that, we favor the establishment of lower ocean rates to and from South Atlantic and Gulf ports where distance favors those ports, as long as lower ocean rates from or to North Atlantic ports are in effect where distance favors North Atlantic ports.

BE IT RESOLVED, that we are opposed to a monopoly in shipping, whether it be an American monopoly or a foreign monopoly, and we quote with approval the anti-monopoly clause of the Administration's recent Shipping Bill:

"It is hereby declared to be the policy of Congress to discourage monopoly in the American merchant marine, and, in pursuance of this policy, the Shipping Board is directed, in the development of its sales and its assignment policy, to continue as far as possible and practicable, subject to the provisions of this section, all existing steamship routes and regular services, and to endeavor in every way to bring about the permanent establishment of such routes and services, and their retention, as far as possible, in the hands of persons having the support, financial and otherwise, of the domestic communities primarily interested in such routes and services."

BE IT FURTHER RESOLVED, that we are opposed to any curtailment of the existing trade routes as a thing calculated to restrict our outlets; to congest our traffic in a few ports and upon a few railroads leading to those favored ports; and to increase car shortage, and;

BE IT FURTHER RESOLVED, that, in our judgment the time has not arrived when the capital of the small American investor can be profitably or safely invested in American flag ships, and, therefore, we believe that the forced sale of American flag ships at this time will have the effect of gradually driving this vast tonnage of shipping into the hands of selfish monopolies which will use the tonnage with an eye single to profits and without thought of the development of American agriculture, manufacturing and commerce, and;

BE IT FURTHER RESOLVED, that, we urge the President and the Shipping Board to do everything to encourage the retention and the ultimate purchase of the new trade routes by "persons having the support, financial and otherwise, of the domestic communities primarily interested in such routes and services"; thus carrying out the spirit and the letter of the Merchant Marine Act of 1920, which very definitely contemplates the ultimate purchase of these new trade routes by independent local companies and not by shipping monopolies controlled by and interested primarily in other ports.

Shipping Board Prepares for Government Operation

THE United States Shipping Board, having failed to receive satisfactory bids for any considerable number of its ships, has begun the preparation of plans for direct government operation of its fleet. At a meeting held on June 4 the board adopted a resolution appointing a committee consisting of the chairman, the vice-chairman and Commissioner Thompson to prepare a plan to be submitted to the board "with a view to the formation of such companies or organizations, to be owned and controlled by the Shipping Board, as it may ascertain to be necessary for the purpose of operating sufficient vessels to fully cover world trade routes under the American flag consonant with the greatest possible economy and efficiency in direct government operation."

Chairman Lasker, who retired on June 19, will be succeeded on the committee by the new chairman, Edward P. Farley. During the period of the study and until the plan evolved has been adopted by the board, operations will proceed through managing agents as at present. It is the hope of the board, however, that the new plan will soon be fully operative, as in principle many of the details have already been developed.

Commissioner Lissner reported to the board the results of the negotiations had in New York by the committee representing the board in connection with bids for routes not now operated by the government and said that but three or four promising bids remained. The board instructed the committee, together with the chairman, to continue in negotiation, so that when the new plan is determined upon the board will know just which of its lines, if any, are to pass into private hands.

The bids which have been considered by the committee included one from Norton, Lilly and Company, for certain vessels operating from New York to the east coast of South America; the Argo line for two ships between New York and the United Kingdom and the Pacific coast; the Orient, the Columbia Pacific for twenty ships from the Pacific coast to the Orient; Mayor Rolph of San Francisco and associates for ships between San Francisco and Australia; the Robert Dollar interests for ten passenger vessels between the Pacific coast and the Far East; the Pacific Mail for five ships operated out of San Francisco, and W. R. Grace and Company for two ships to the west coast of South America.

RETIRING CHAIRMAN OF SHIPPING BOARD REVIEWS HIS ADMINISTRATION AND MAKES RECOMMENDATIONS

In a letter to President Harding, announcing his retirement as chairman of the United States Shipping Board, Albert D. Lasker has given a report on the accomplishments of the board during the two years of his chairmanship. Among the achievements Mr. Lasker mentions are the settlement at 12 cents on the dollar of claims aggregating $200,000,000; the bringing of the Emergency Fleet Corporation out of chaos into an economic, efficient and distinct entity; the reduction of its deficiency from $16,000,000 a month to $4,000,000 a month; the development of commerce through the operation of American ships and the disposal of surplus real estate and materials. At the end of the current fiscal year the Shipping Board would have on deposit in the

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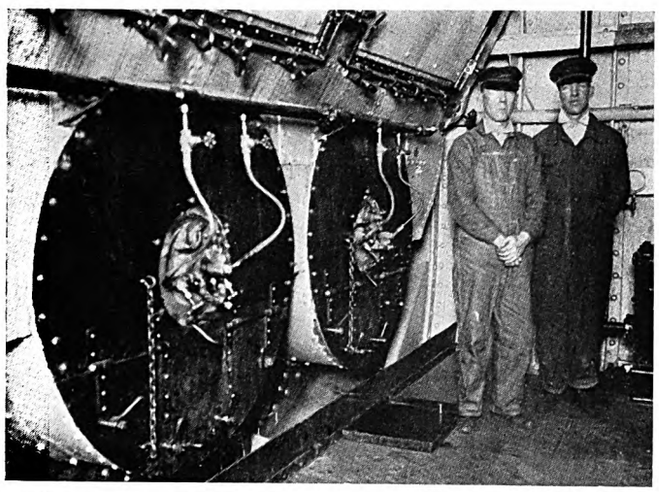
Treasury, Mr. Lasker stated, $125,000,000, as against a total cash reserve of $4,000,000 it had when Mr. Lasker took office. After reviewing the administrative work accomplished, Mr. Lasker made recommendations concerning the proposed government operation of America's merchant marine in the event the negotiations for the sale of the fleet to private American individuals are not successful.

Mr. Lasker said that since the failure of the subsidy bill and as it appeared that most of the bids for the government fleet would be inadequate, the only apparent alternative is to "go the full length of direct government operation," but always with a view to ultimate sale to private owners. In the event of failure to sell the ships on an adequate basis, therefore, he recommended the creation by the Emergency Fleet Corporation of 12 to 18 subsidiary corporations to operate the existing freight lines, with about 250 ships; the use of approximately 200 remaining ships as a reserve, some of them to be equipped with Diesel engines and allotted to the operating companies; the sale of the other ships at the best prices obtainable and the scrapping of those for which the board is unable to find a purchaser at home or abroad.

Hudson River Day Line Steamer *De Witt Clinton* Converted to Oil Burner

BEFORE entering her regular service this summer the Hudson River Day Line steamer *DeWitt Clinton* was converted from a coal to an oil burner. The vessel is a twin screw steel steamer of 3,539 gross tons, propelled by two four-cylinder triple expansion engines, each developing 2,243 indicated horsepower, supplied with steam

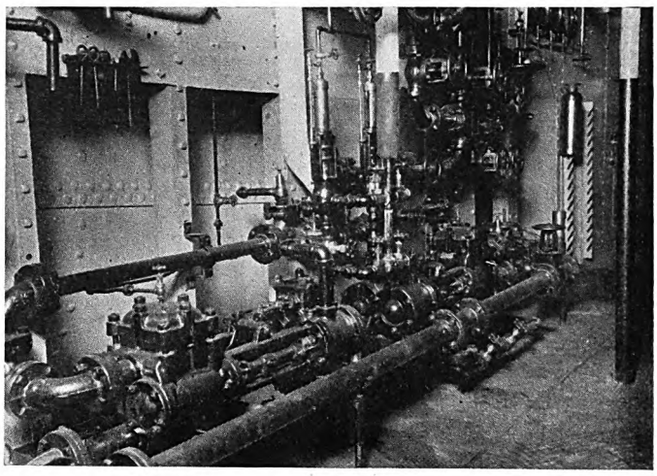


Oil Burning Equipment on One of the Boilers. At Right (from Left to Right) Are Chief Engineer R. G. Siter and Second Assistant Engineer Robert Tell

at 185 pounds per square inch by six 2-furnace Scotch boilers, working under Howden's heated forced draft and having a total heating surface of 12,417.6 square feet. Peabody oil burning equipment of the most improved type was installed by the engine room staff of the steamer, the tanks for carrying the oil fuel being installed by W. & A. Fletcher Company.

The oil burning equipment, supplied by the Peabody Engineering Corporation, New York, comprises, in addition to the Peabody-Fisher wide range burners and their necessary piping, two Dean horizontal duplex oil pumps, 6 inches by 4 inches by 6 inches, two Griscom-Russell straight tube five-pass oil heaters (either set being of sufficient size to handle the entire load) and a 3-inch suction and a 2-inch discharge strainer both of the duplex type.

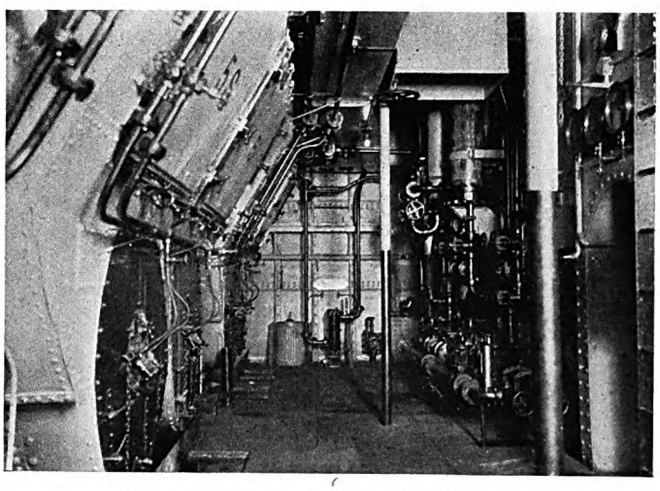
The special feature of this installation is that it maintains the good points of the Howden heated forced draft system while it avoids the objectional feature of using, when



Duplicate Sets of Oil Pumps Are Installed

burning oil, the cast iron fronts designed for coal burning, in which the air is unevenly distributed. In this case the Howden coal fronts were removed and the latest type Peabody double ported registers were fitted, with an outer casing connecting directly with the hot air ducts leading from the Howden heaters, thus using the desirable features of the Howden system, while avoiding the undesirable points.

This arrangement gives a double control of the air to the burners, which can be very accurately adjusted. As the Peabody-Fisher wide range burners, fitted with their central control valve, were installed in this case, the engineer has absolutely under his control the handling of both air and oil so as to give the best results in regard to the amount of oil



General View of After Boiler Room

consumed and the power developed. This was well demonstrated on the recent trial trip of the vessel, when the ship was brought from full speed ahead to a stop and the steam pressure was maintained without blowing steam, changing tips or putting out fires, no smoke showing during the change. This arrangement also gives ready means of running the vessel under natural draft, when it is not desired to operate the blower fan.

This installation was laid out by Mr. E. B. Sadtler, of the Peabody Engineering Corporation, and carried out by Chief Engineer Russell G. Siter, of the S. S. *DeWitt Clinton,* and his able assistant, Mr. Robert Tell.

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America Will Fight for Place on the High Seas

Nothing Will Be Overlooked in Training Our Merchant Marine to Meet Aggressive Foreign Competition on an Even Footing

By "Old Scotch"

WE are passing through a momentous period for the future of Mr. American Merchant Marine. The industry is somewhat "groggy" from what looked to be a knockout blow, when Congress failed to do anything constructive for our champion, and left us groping around in a dazed condition to get up steam and energy enough to make a further attack on our old opponent, Mr. Aggressive Foreign Shipping. We are gradually wiping the blood out of our eyes, getting back our breath, and sparring around the ring for another opening.

Things look rather squally at the present writing and unfriendly "bookmakers" (editors of foreign shipping papers) are offering odds against our ultimate success in this prize ring of shipping on the seas. Our Uncle Samuel, while unwilling apparently to give us any life-inspiring oxygen treatment, is delivering to us the ultimatum that, if we do not resume the battle on our own strength alone, he will step in the ring himself for a round or two, and show us how to battle.

Government Ownership Not the Final Answer

Of course, Uncle Sam has a couple of brass knuckles on his fists, in the shape of a strong Treasury behind him, but such, while it lasts, is not teaching us the game of fighting. Besides that, the spectators who put up the coin for Uncle to battle with are a fickle bunch, like all other gatherings at sporting events, and at a critical time are liable to yell "Take him out," if he wabbles a bit in the encounter.

Naturally, rather than to see the fight called off entirely, we are willing to see Uncle do the fighting himself, at least until our breath is fully recovered, and we can take off a little more of the extra weight we have been carrying, and be able to get back in the ring ourselves for another try for the championship. As the gate receipts for events of this kind are very lean just at present, we had better bestir ourselves to getting in better condition, while Uncle keeps our opponents busy with his brass knuckles.

American Shipping Men Will "Carry On"

No, we are not discouraged, and we haven't lost sight of the prize for which we are battling. This extra weight we are carrying can and will be worked off before we again tackle our enemies. When Uncle lets us take our place in the ring again, we would like a few cheers from the ringside, as nothing helps so much in a fight of this kind as to know that your own gang is with you.

Our seconds and trainers have outlined very good methods of training to reduce our surplus weight, and to harden up our muscles. The training process prescribed is now going merrily along on all sides. Already plans are in process for unloading the greatest part of our excess weight, in the shape of the great fleet of idle ships that stand as a menace to the real competition we are about to enter. Uncle has charge of this part of our weight reduction, and, if rumors be true, a very considerable portion of the laid up fleet is to be "scrapped" or "canned" whichever way may seem best to accomplish the ultimate purpose.

Part of Idle Fleet to be Converted to Motorships

Such of the fleet which represent good fighting muscles are to be retained and put on the firing line, backed for the time being by Uncle. Others whose muscles are somewhat flabby, due to bad digestive apparatus in the shape of inefficient machinery, will have this defect remedied by the installation of Diesel engines, which will make of them real hardened muscular constituents of the fighting body of our merchant marine.

Fuel Economy Improving

The overweight of inefficiency in operation in existing ships now being used on the firing line is being reduced on all sides. The Shipping Board's fuel economy efforts are getting more and more in evidence: The training of men in the proper and efficient use of fuel oil is showing better results all along the line, as the number of graduates of the League Island School are being distributed throughout the merchant marine. These graduates not only show better results, as the direct effect of their intensive training, on the ships which they operate, but they are rapidly disseminating the knowledge which they have received to others with whom they are associated who have not received the benefits of the special training. This whole effort will harden up a most important muscle in our fighting body on the competitive seas.

Cost of Repairs Being Reduced

The cost of repairs has heretofore been a decidedly flabby muscle and a cause of much "overweight" in our fighting abilities. Very cheerful results are now being obtained from the increased skill and fighting spirit of the men who have this particular branch of the training activities in hand. Fighting spirit appeals to the average American, and this is being inculcated in our sea-going scrappers to a splendid degree, as each engineer has it impressed upon him that he must do his individual part in reducing repair costs, if our fighting merchant marine is to have a chance in the great international prize fight on the sea.

Inventors are rushing to the aid of our fighter, in the shape of improving the muscles in use by bringing out new ideas, for economizing in fuel consumption. Feed water heaters, superheaters, evaporators and economizers are receiving the most intensive study from the men who know most about these essentials to the economical use of fuel, and the reduction of repair costs.

In training a fighter of the type we want our merchant marine to be, it is not always best to take too much consideration of the first cost of essentials of this kind, as it is results we are after. High cost apparatus which greatly reduces the daily cost of operation is ofttimes a very cheap investment to make. In training a human fighter for a contest involving tremendous stakes, as modern fistic encounters do, just note how little heed is paid to the first cost of such essentials as the best quality of food or training apparatus to put the scrapper in shape for the great event. Results alone count when you are out to accomplish a definite object, whether in fistic encounters or in its parallel contest for a right to conduct a good part of our own commerce on the seas.

As this is to be a "gruelling" contest, as sport writers usually say, the preparation of our champion must be thorough and begin with the elementary essentials.

Marine Standards Committee to Eliminate Waste

The American Marine Standards Committee suggested by Uncle, through his Department of Commerce, is now launched and ready to begin its part of the training process.

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The general idea that this movement was to be conducted by our Uncle as one of his contributions to the preparation of our fighter is entirely erroneous. Uncle's function in this matter is merely to wave the fan and encourage the fighter between rounds. Its sole purpose is to eliminate waste at the training table. Representatives of all the branches that are constructing our fighting merchant marine are to get together and by mutual conferences prepare standards for all details, which lend themselves to standardization, and in this way to reduce some of the "overweight" entering into the shipping body.

This training phase is also to extend to the handling of the fighter after he goes into the ring. All waste motions must be eliminated in looking after our sea pugilist between rounds, which corresponds to the times when the ships are in port. These periods must be given the best and most efficient attention, so the A.M.S.C., through that branch of its activities, has enlisted some of the best talent in the country to cut out waste and standardize our activities while the ships are in port. If they are handled properly and expeditiously, they will be freshened up for the real fighting in each succeeding round.

EXPERIENCED COUNSELLORS AT HAND

At all ringsides it is usual to have experienced men, who themselves have long engaged in fistic encounters, to counsel and advise the active participant in the fray at hand. In our sea-fighting contest we must have such counsellors to aid us, drawn from the ranks of the experienced in the fighting game. We do not have such a large number from which to choose, but, such as we have developed in the small fights we have been through will make up for quality in what they lack in numbers.

When we are all set for the fray, as we must be at no distant date, if Uncle succeeds in holding off our opponents while he is temporarily occupying the ring, our champion will go in for the fight of his lifetime. The fight is already being widely advertised. The battling ground is chosen, the seconds and trainers are working hard to get their men in shape. The stakes are enormous, and are measured in millions of dollars. The world at large will furnish the spectators, and the American contingent at the ringside will have to be well organized to cheer on their champion, as each one present is vitally interested in the results. International rules will govern the contest, and there must be no foul blows resorted to by either contestant.

Secure your tickets early for the world's greatest contest between Mr. American Merchant Marine, the young champion of the Western Hemisphere, and Mr. Aggressive Foreign Shipping, the victor in many hard-fought contests heretofore.

Will young fighting blood bow to this hardened old fighter of the seas? is the question to be answered.

We'll say NO.

An Analysis of Claims of the Electric Drive Over the Geared Drive

By J. C. Shaw*

VARIOUS articles and papers have been published and read, from time to time, in the technical press and before the different societies advocating the steam-electric drive for marine propulsion. These have been conspicuous by the scarcity of any real figures to substantiate the claims for the superiority of this drive, the data being mostly theoretical, and based on assumptions generally better known to the authors.

An excellent example of one of these articles is that which appeared in the May issue of MARINE ENGINEERING AND SHIPPING AGE by Messrs. Watson and Thomas, of the General Electric Company, entitled "How to get a Shaft Horsepower for All Purposes with Steam on from 0.75 to 1.00 Pound of Oil."

They have entirely begged the question, as they do not inform the readers any details as to 'how' this is to be accomplished. They present the usual theoretical curves for economy, consisting in this case of water rates and oil consumptions for all purposes per shaft horsepower as ordinates and normal shaft horsepower of the vessel as abscissæ, the power varying from approximately 3,000 for the cargo ship to 22,000 for a liner.

Two sets of curves are shown, based on 200 and 250 pounds steam. The article is also illustrated with pictures of the electric driven ship *Independence.*

In the June number of MARINE ENGINEERING AND SHIPPING AGE, furthermore, there is given the specification of a proposed liner of 10,000 shaft horsepower in which the electric drive is proposed to be used, the oil consumption being here stated as 0.85 pound for all purposes per shaft horsepower, but which figure is also seriously to be questioned.

Thinking that readers of MARINE ENGINEERING AND SHIPPING AGE would be particularly interested in some actual figures obtained in service with the electric drive, in contrast to what has been published for advancing its cause by its advocates, the author presents that which follows:

VESSELS EQUIPPED WITH ELECTRIC DRIVE

The electric drive has now been installed in five vessels belonging to the Shipping Board and has accordingly been given a thorough tryout for this particular service by competent operators. Several battleships in the United States Navy have also been built, employing the electric transmission, and it can be unreservedly stated that the actual results for either type of vessel, which are now available, fall far short of the claims made by its sponsors.

The five Shipping Board vessels referred to are the *Eclipse, Independence, Archer, Victorious* and *Invincible*—the *Independence* being used, as previously stated, to illustrate the article of Messrs. Watson and Thomas. These vessels originally had geared turbine machinery, which proved unsatisfactory in service due to defective gearing.

These vessels have a length of 440 feet between perpendiculars, a beam of 56 feet and draft of 28 feet 7 inches, corresponding to 15,700 tons displacement. The block coefficient, which is 0.68, is unusually fine, and the vessel is accordingly suitable for considerable more speed than the original designed speed of 11 knots, corresponding to 3,000 shaft horsepower with propellers running at 90 revolutions per minute.

The old geared turbine, of General Electric type, con-

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sisted of five stages, operating at 3,600 revolutions per minute and driving through a single pinion double reduction gearing. This turbine was replaced by one of the same general design, but having no reversing wheels and incorporating more stages and other improvements tending to better the thermal efficiency. The later turbine is coupled to a generator rated at 2,360 kilowatts, which supplies three phase current at 2,300 volts to an induction motor rated at 3,000 shaft horsepower, running at 100 revolutions per minute and direct-connected to the original shafting. The blades of the propeller were set to the minimum pitch permissible, for favoring the installation of the motor, which was limited as to diameter and corresponding maximum number of poles that could be employed, the designed revolutions being increased from 90 to 100 revolutions per minute for the 11 knots.

The boilers, which are Scotch with Howden draft, are the original, but superheaters of the Schmidt types were added to give approximately 200 degrees superheat, which, with the more improved design of turbine, was expected to more than counteract the inherent electrical losses, calculated as not over 10 percent, with 80 percent power factor. The latter, however, works out in service about 70 percent, reducing thereby the effective capacity of the generator with a corresponding increase in the I^2R loss due to the wattless current.

Performance of the Eclipse

The first of these vessels to be converted was the *Eclipse*, which was put into service the early part of 1921, and the following data were obtained on the maiden voyage, initiating the new drive:

Total distance, nautical miles	23,611
Mean speed, knots	9.78
Fuel consumption	33.2
Shaft horsepower	2,422
Pounds of oil per shaft horsepower	1.28
Superheat, degrees	198
Boiler pressure, pounds per square inch	214
Chest pressure, pounds per square inch	189

The conclusion reached by the operating company as a result of their experience with the vessel on this voyage, which was arrived at by comparing results with a voyage made before the vessel was changed to electric drive, was that the consumption was increased by 10 percent over that of the original gear drive. Furthermore it was estimated that had the new installation not been equipped with the superheaters the fuel consumption for the electric drive would have been 20 percent more, instead of 10 percent.

Subsequent data obtained from the *Eclipse* in service, and her sister ships, substantially confirm this original unfavorable report, checking very closely the figures obtained on the first voyage of the *Eclipse*. These additional data are shown in Table I, which is made up from the ship's logs, taking the best portions of voyages uninfluenced by adverse weather conditions. The light draft operation of the vessels have been eliminated, and only those portions approximating normal draft conditions have been employed for the general averages shown in the last column. The third column has been inserted to show the effect of draft on speed and economy for the *Independence*. The averages for power and revolutions are arrived at by multiplying same by hours and dividing by total hours. The average power, it will be noted, is 2,396 shaft horsepower, corresponding to 9.92 knots, and which is estimated 10 percent too high for the particular speed. This poor propulsive efficiency is no doubt due to the high turns of the propeller employed to favor the motor, as previously stated.

Comparing the above results with a modern compound marine turbine, using saturated steam, the oil consumption per shaft horsepower is about 30 percent greater for the electric drive using superheated steam. This is based on 1 pound of oil per shaft horsepower, which is easily being realized in service with the first drive with properly coordinated auxiliaries. Using the same degree of superheat, the difference in favor of the geared drive would be still more marked, based on the same propulsive efficiency for either drive.

Results with Electric Drive on Naval Vessels

Referring to the results that have been obtained in the Navy with the electric drive, as compared with the geared drive, this is best seen graphically in Fig. 1. Curves "A" and "B" for the battleships *California* and *Tennessee* are seen to have the same general characteristics, though ma-

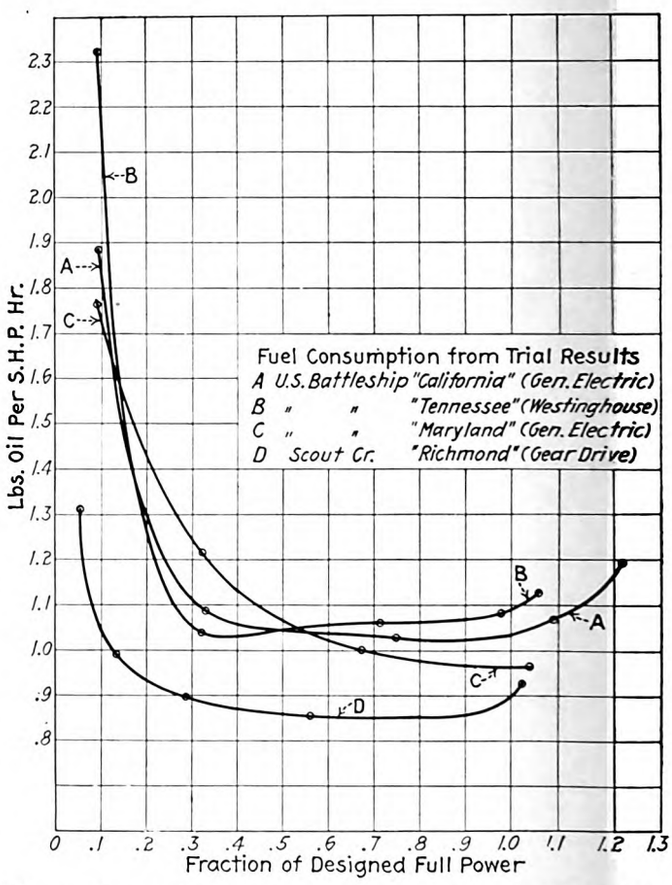

Fig. 1.—Comparison of Fuel Consumptions for Electric Drive and Geared Drive, Based on Fraction of Designed Full Power

Note—Designed power: battleship, 28,500; scout cruiser, 90,000. Battleships use superheated steam, scout cruiser saturated steam.

chinery was supplied by the two independent electric companies interested in this drive. Curve "C," shows the consumptions for the *Maryland*, and is from the only battleship trial data, showing oil consumptions, published heretofore regarding these vessels. It is to be noted that it has an entirely different characteristic to the other two curves, and which is apparently due either to the method of measuring the oil or not including all the auxiliaries in this measurement.

The battleship has two screws and two turbines, while the scout cruiser has four screws and four sets of turbines with a boiler room separating the forward and after independent engine rooms. The scout cruiser is accordingly equivalent to two battleship installations of 45,000 shaft horsepower, and comparable with the present battleship installations of approximately 30,000 shaft horsepower.

Comparing the results of the scout cruiser, shown by curve, with the mean of "A" and "B," it will be observed that the

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TABLE I—PERFORMANCE OF ELECTRIC DRIVEN SHIPS

Eclipse—Independence—Archer—Victorious

	Eclipse	*Independence* No. 2		*Archer*	*Victorious*	Average for
Voyage	No. 2 (A)	(B)		No. 2 (C)	No. 1 (D)	A-B C & D
Route	Savannah to Otaru via Panama and Honolulu	Balboa to Yokohama via Honolulu	Saigon to Havre via Singapore & Port Said	New York to Yokohama via Panama & Yokohama	Cristobal to Yokohama via Honolulu	....
Mean draft	28′ 8″	24′ 10½″	22′ 7″	28′ 8″	28′ 3″	27′ 8″
Mean displacement (tons)	15,950	13,748	12,325	15,665	15,605	15,450
Total hours (bar to bar)	1,062.25	787.61	809.97	1,014.9	820.7	3,685
Total distance, miles	9,894	8,235	8,630	10,316	8,081	36,526
Mean speed, knots	9.31	10.58	10.67	10.17	9.85	9.92
Mean S. H. P.	2,224	2,365	2,437	2,766	2,200	2,396
Fuel consumption at sea (tons)	1,363	1,143	1,165.5	1,456.4	1,150	5,112
Fuel consumption at sea, tons/24 hrs	30.8	34.87	34.6	34.5	33.6	33.3
Mean R. P. M.	88	96.4	92.2	92.4	87.2	90.8
Mean lbs. per S. H. P.	1.292	1.375	1.326	1.165	1.427	1.297
Boiler pressure	210#	205#	208#	.....	.....	.....
Superheat	195° F.	195° F.	214° F.	.....	.....	.....
Vacuum (inches)	27.5	28	28.4	.....	.....	.....
Miles per ton fuel	7.26	7.20	7.4	7.08	7.03	7.15
Pounds fuel per knot	309	311	303	316	319	313

electric drive requires, on an average, 18 percent more oil per shaft horsepower at full power, 22 percent more at one-half power, and about 90 percent more at one-tenth full power, the latter corresponding approximately to the 10 knots cruising speed of battleships. The scout cruiser is handicapped, furthermore, at full power due to the much higher rate of oil burned per square foot of heating surface, 80 percent of full power of the *Richmond* corresponding to about the normal full power condition of the battleships.

The foregoing, therefore, entirely disproves the most cherished claim of the electrical advocates, which is for higher economy at the reduced or cruising powers.

IMPROVED THERMAL EFFICIENCY OF GEAR DRIVE

The gear drive has certain inherent advantages for improved thermal efficiency, which are not common to the single unit turbine, as necessarily required for coupling to a generator. This is because the gear easily permits of cross compounding of turbine, thus permitting the turbine blading design to approach the ideal conditions for best efficiency.

At approximately one-half power for the cruiser, additional blading is cut in on the forward end of the high pressure turbine, and at one-quarter full power additional blading is put into action. These additional groups of blading carried are designed for maximum efficiency for the particular power and speed at which they are put into operation.

For the cruising speeds of 20 knots and under, a special high speed cruising turbine is employed in each engine room, coupled to the forward end of one of the high pressure turbines through additional gearing. These take the high pressure steam first, exhausting to the forward ends of the high pressure turbines, or the one-quarter power belts. It is for this reason principally that the scout cruiser at one-tenth power actually shows about the same economy as the electrical battleships at full power. The inherent electrical losses, due to the electrical transmission, are given as 10 percent at full power and 20 percent at one-tenth power, which latter is based on one-half the power plant in operation for favoring the economy at this speed.

Advocates of the electrical drive have also frequently made other claims besides that of economy, as, for instance, greater reliability with freedom of troubles, greater flexibility of drive and simplicity of control than that with the geared turbine arrangement. These are far from being the actual case.

RELATIVE RELIABILITY, FLEXIBILITY AND SIMPLICITY OF THE TWO DRIVES

The William Cramp and Sons Ship and Engine Building Company has built at the present time over a million horsepower of geared turbines without once encountering gear trouble, and other experienced marine builders can testify to the same experience.

As to the cargo ship arrangement having the electric drive, in which there is only one turbine coupled to generator and the one motor driving propeller, if there is trouble with any one of the units, the vessel has to be completely stopped. It is for this reason alone that many experienced shipowners will not consider the electric drive, and for the same reason it is looked on with disfavor by the underwriters. This is not so with the single screw compound geared turbine arrangement, which, in case of damage to either high or low pressure turbine, or their respective pinions, is only one-half as likely to be put entirely out of commission, special piping being provided for permitting either turbine to operate in such a contingency.

The electric drive has other well known disadvantages not common to the steam drive.

OPERATING DEFECTS OF ELECTRIC DRIVE

There are the necessity for having a specially trained engineer force, the liability of short circuits in the windings on account of moisture, the ever present danger with the high voltage employed and the defects of the induction or synchronous motor when used for this service.

At the present time there is a leaning toward the synchronous motor by the electrical experts, due to the induction motor's small air gap, and the all inductive load it imposes on the generator with resultant low power factor.

The synchronous motor, however, requires a more complicated starting gear and is more prone to fall out of step when much overloaded. This latter operating defect is particularly apt to occur in rough weather with the cargo ship, in which the power is small in proportion to the displacement, when there occurs a large variation in the torque. In case of two screws, or more, driven by motors supplied by current from a common alternator, the screws are locked together by the synchronous speed of the generator. This makes for bad maneuvering and it is for this reason that the electrically driven battleships require that both generators be in operation when making port, which is so that each motor will have its independent source of power.

The claim for greater simplicity of control for the electric drive is far from being correct, as shown by the multiplicity of levers, switchboard instruments, rheostats, synchronizing devices, etc.

Other arguments that have been made against the gear drive for advancing the cause of the electric drive are that there are losses due to the astern turbine being rotated idly when going ahead, lack of ability of the astern turbine to develop the full ahead power, and the possibility of trouble with astern blading when high temperature steam is admitted to it suddenly.

The first of these can be dismissed by pointing to the low oil consumption on the scout cruiser and similar vessels.

(*Continued on page* 434)

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Applications of Arc Welding to Ship Construction

By E. H. Ewertz*

Those who have been interested in the applications of welding in the above field, have for a long time felt the need of a digest of the available literature and unpublished existing information. This need was recognized by the Electric Arc Welding Committee of the American Bureau of Welding and with its cooperation Mr. E. H. Ewertz has prepared such a review. The report includes a summary of the present applications of welding as compared with riveting, a description of the arc welded ships already in existance and their performance, a review of the repairs to the German liners and the results of tests in England and the United States to demonstrate the adequacy of welding as applied to ship construction, a description of the several designs of welded ships, a comparison of the advantages of welding versus riveting and finally a bibliography. It is needless to say it is the most complete summary available on this subject. It was prepared for the use of the ship designer, the draftsmen and those interested in the application of welding in this field. We trust that those interested will find it useful.

C. A. Adams,
Director, American Bureau of Welding

THE design and construction of a ship presents problems of such diversified character and stresses so difficult to define, that, today, the past practice and established rules of various organizations govern the design of a ship both as a whole and as to details. Therefore, new principles of designs and joining parts together are slow at being adopted even though the marine engineer is convinced that by the use of such new designs he would be able to produce a stronger, more serviceable and a less costly ship.

Probably one of the most important new developments in ship construction is based on the use of electric arc welding for joining the various parts together. While such welding has already been applied extensively to the less important parts of a ship, we also have ships where electric arc welding has been used for the more important parts, known as the strength members of the ship. The ship classification societies, by whose rules designers and builders are largely governed, recognizing the merits of electric arc welding as applied to ship construction, have made and are constantly making tests and experiments, enabling them to issue from time to time additional rules, so that today it is possible to use electric arc welding for joining together practically all the parts of a ship.

Original Iron Ship Construction

In the early stages of iron ship construction, before steel manufacturers had conquered the process of rolling shapes, the iron plates forming the sides of a ship were reinforced by framing made up of flat iron bars, fitted on their edges against the ship's sides and held to the plates by means of flat U-bent clips, having rivets in the flanged ends, and this established a T construction between the shell plating and flat bar.

This method of construction was naturally weak in that the connection between the two steel members, the flat bar and the shell plating, was not continuous and, therefore, when angles, channels, bulb angles, Z-bars and other such parts were obtainable, it was perfectly natural that such shapes should be adopted as they permitted riveting in the flange connecting the important members. Thus the bar and the shell produced the same T construction as was found on the earlier ships, but here rivets could be placed close together in the connecting flange of the shape, thereby making a practically continuous connection. However, a still better connection would be obtainable, if the flat bar was joined to the shell plating by welding, making the two members one.

Welding by heat is now used extensively in some of the important parts of a ship, such as forgings for stern posts, rudder frames, main engine parts and also in forming offsets and bends in angles as well as in many other details. Welding in some cases may even be found in the ship plating. All such welding has an element of uncertainty connected with it and, therefore, in calculating the strength of such welded parts, a large factor of safety is allowed to protect against failure. Often it is desirable to weld parts that are beyond the capacity of the builder's facilities; then riveting or bolting has to be adopted.

Riveting, also, has its hazards, for heavy locked up stresses are produced in the driving of a rivet and stresses are set up in the plating nearby due to hammering. It is often impossible with the best workmen to obtain fair rivet holes and therefore rivets are frequently driven into odd shaped holes, adding uncertainty to the results obtained. While the testing of rivets is readily performed, it is frequently found in tests of compartments that the water produces an excessive strain on the rivets. Again, rivets having passed all the tests during the ship's construction are sometimes found incapable of standing stresses produced by the ship working in a heavy sea.

The vast amount of skilled labor required to properly form the various members of a ship's structure, to make and punch rivet holes, to bolt together and fair up the various parts, is labor that is little understood by the average engineer. The hazards, however, due to human incapability to produce perfect work are offset by the liberal margin for safety allowed for in the classification rules; therefore, we seldom hear of disaster to a ship due to faulty construction.

Welding Would Give Ideal Condition

That further application of welding to ship construction is desirable is evident particularly when we remember that the use of rivets was a method of construction that was made necessary on account of the lack of the proper facilities for further extension of welding of parts, and also because material for parts had to be made to a size suitable for manufacturing and handling. An ideal ship, however, would be made to what might be considered one piece, welding having joined all of the parts into one. But, in the future, as in the past, where the human element enters into the construction, a suitable margin of safety should be allowed for in the calculations and properly trained men as well as the right type of electric arc welding machines and suitable electrodes should be used.

Many tests of various natures have been made to establish

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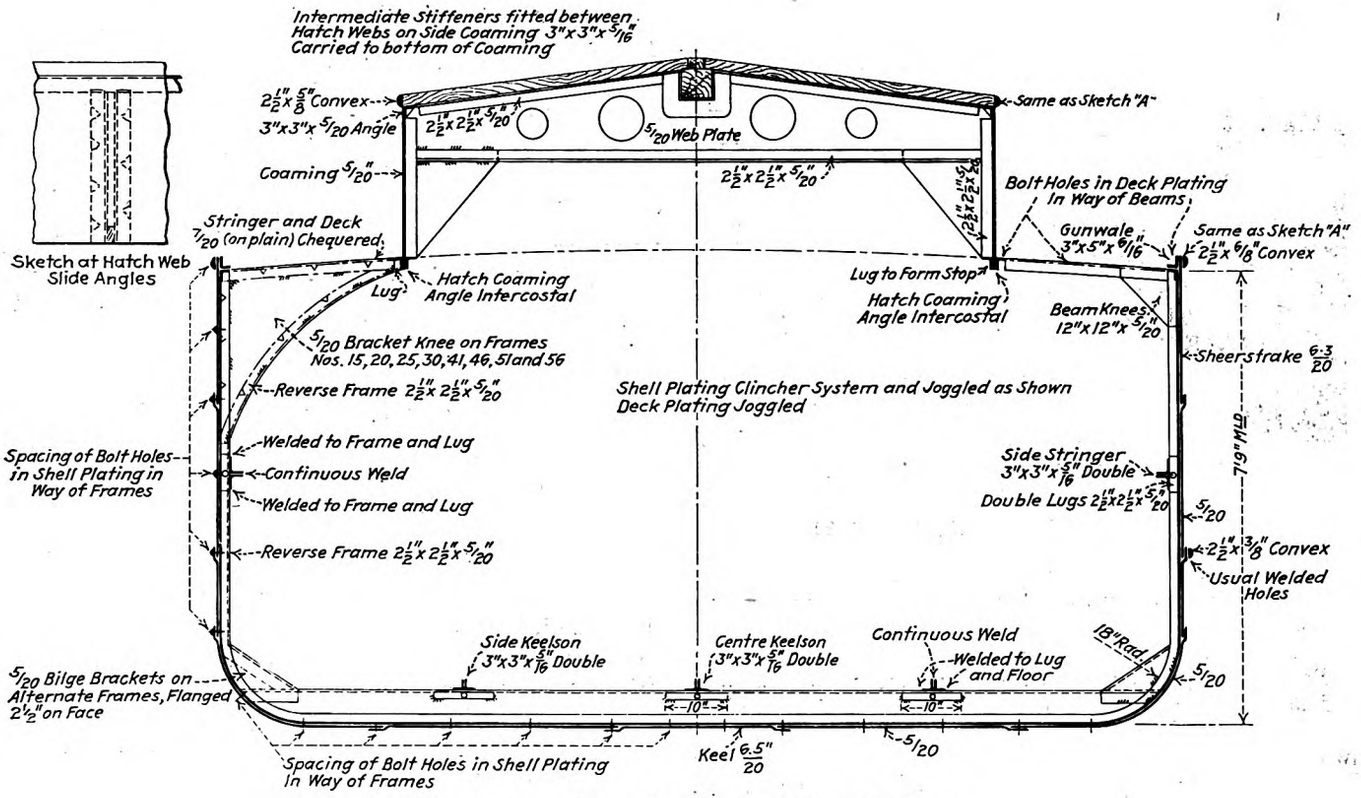
Intermediate Stiffeners fitted between Hatch Webs on Side Coaming 3"x3"x5/16 Carried to bottom of Coaming
Sketch at Hatch Web Slide Angles
Same as Sketch "A"
5/20 Web Plate
Bolt Holes in Deck Plating In Way of Beams
Gunwale 3"x5"x6/16
Same as Sketch "A"
Stringer and Deck 7/20 (on plain) Chequered
Lug
Hatch Coaming Angle Intercostal
Lug to Form Stop
Hatch Coaming Angle Intercostal
Beam Knees 12"x12"x5/20
5/20 Bracket Knee on Frames Nos. 15, 20, 25, 30, 41, 46, 51 and 56
Sheer strake 6.3/20
Reverse Frame
Shell Plating Clincher System and Joggled as Shown
Deck Plating Joggled
Welded to Frame and Lug
Spacing of Bolt Holes in Shell Plating in Way of Frames
Continuous Weld
Welded to Frame and Lug
Side Stringer 3"x3"x5/16 Double
Double Lugs
Reverse Frame
Usual Welded Holes
Side Keelson 3"x3"x5/16 Double
Centre Keelson 3"x3"x5/16 Double
Continuous Weld
Welded to Lug and Floor
5/20 Bilge Brackets on Alternate Frames, Flanged 2½" on Face
Keel 6.5/20
Spacing of Bolt Holes in Shell Plating In Way of Frames

Fig. 1.—Midship Section of Cross-Channel Barge

standards that give equal or better connections between parts than that obtained by riveting or bolting. The Government and ship classification societies have joined with the American Welding Society and other similar bodies in the making of these tests, as well as testing electrical machinery, the material to be welded, and the material to be introduced into the weld—all have been subject to the most careful study and so we now have available data that are in some respects superior to the data used in the old form of construction. Even the problem of the human element has been given careful consideration, and we believe it is now a lesser problem than the same element is in the old type of construction.

Only a small portion of available data in connection with electric welding in ship construction can be given in this paper but further information can be obtained from the many papers referred to in the bibliography; however, before giving these data, we should consider what is now a past—the work of men of vision and determination, who applied electric arc welding in ship construction and, in doing so, gave us the necessary past now to build on.

Fig. 2.—Launch of Quasi-Arc Welded Vessel, A. C. 1320

THE DOROTHY M. GEARY

In 1915, Mr. Geary of the Geary Boiler Works of Ashtabula, Ohio, built a tugboat named the *Dorothy M. Geary*, having a length of 42 feet, a beam of 11 feet, and a depth of 6 feet 6 inches. She was constructed of steel, the shell plating being 3/16 inch, frames 1½ by 1½-inch angles, and bar keel 1 inch by 5 inches. The shell plating was riveted

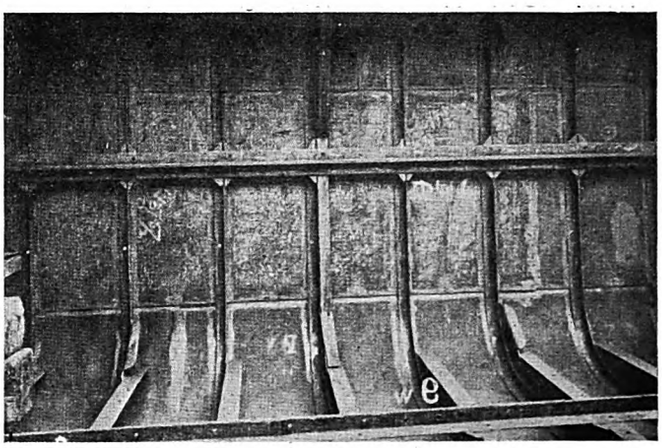

Fig. 3.—Interior View Showing Quasi-Arc Welded Frames, Floors, Stringer and Shell Plating

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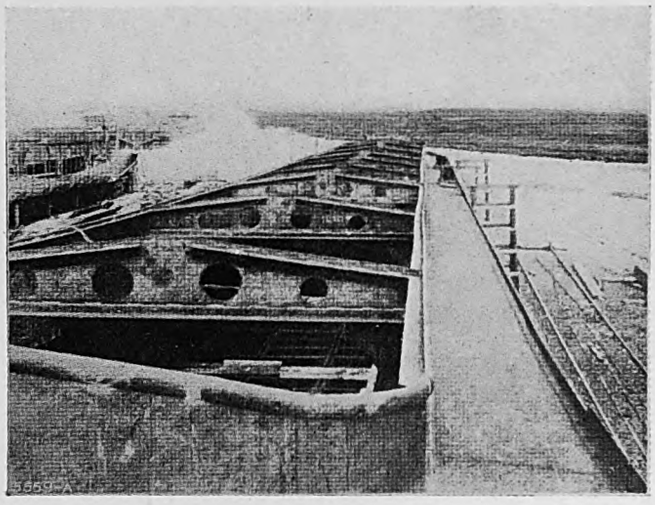

Fig. 4.—View Along Deck, A. C. 1320

to the frames and bar keel, but all other joints like ends and edges of plating as well as all other parts were welded by the use of Lincoln electric long arc welding machines, and bare, soft, steel wire.

This tug has been in constant service all the year around and often, in winter, has had to break her way through ice up to 8 inches in thickness. Once she was caught between two large ships and had her side crushed in 18 inches, raising her deck 6 inches. This damage was repaired by using hydraulic jacks to press the sides out to proper places, and neither these extraordinary stresses nor other service conditions have in any way started or cracked the welding.

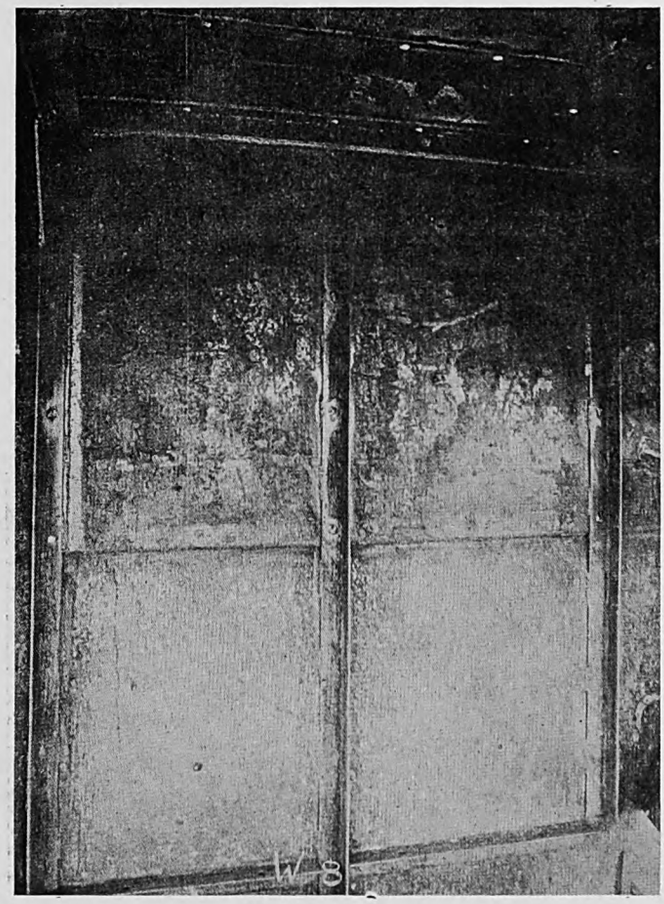

Fig. 5.—Watertight Bulkhead, Showing Quasi-Arc Welded Seams and Stiffeners

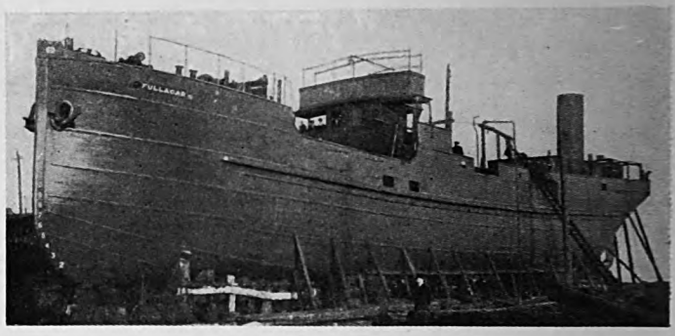

Fig. 6.—Electrically-Welded Coaster Fullagar, Built by Cammell Laird & Company, Ltd., Under the Quasi-Arc Welding Patents

The demand for ships during the great war advanced electric arc welding in a phenomenal way but, due to a lack of proper equipment and also to a lack of trained welders, much work was poorly done making many men prejudiced against this type of welding. Nevertheless, others judging from actual facts continued the process, and in January, 1918, the British Admiralty had constructed at Richborough an all electric welded cross channel towing barge, known as the *AC-1320*. This barge is probably the first all electric welded ship constructed up to that time.

THE AC-1320

The length of this barge between perpendiculars is 125 feet 9 inches, molded breadth 16 feet 4 inches, molded depth

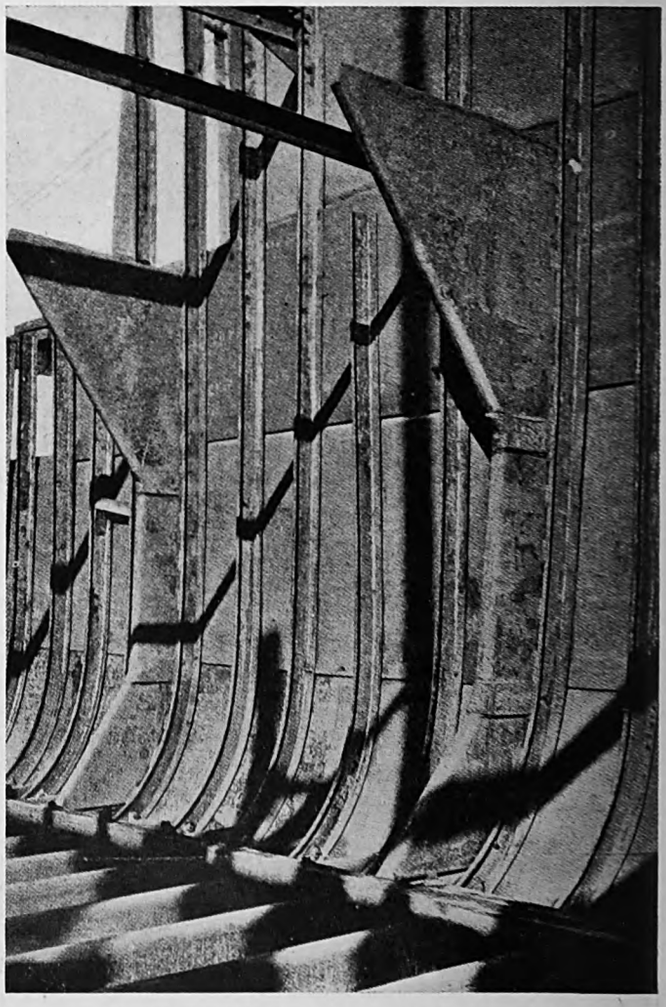

Fig. 7.—Electrically-Welded Ship Fullagar, Floor Plates, Frames and Plating

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7 feet 9 inches. She has a deadweight capacity of 200 tons. She has a curved stem with transverse stern and is fitted with two hatchways 42 feet by 10 feet. There are three transverse bulkheads, the fore and aft being watertight. Frames are 2½ inches by 2½ inches by 4 pound angles with floors of 7 inches by 3½ inches by 7 pound angles, and the shell and deck plating is 5/16-inch thick, tapering to ¼ inch at the ends. She is of the usual barge construction having a flat bottom and sides with four strakes of plating on each side, all joggled and lap welded.

During the erection the parts were held together with service bolts 10 inches or more apart, and after the welding was completed the service bolt holes were plugged and emerged in a satisfactory manner. Last year she was in the service of the Port of Queensborough Development Company, Ltd., whose engineer, Mr. J. W. Bruce, stated after his examination: "This barge has been thoroughly tested by me recently and I find all strake welded laps and joints, frames, web frames, beams and half beams, and all welded parts are in excellent condition. This barge like others of the AC type, has been subjected to very rough treatment and heavy war service during the busy war period at Richborough. She consequently shows definite signs of same, but nevertheless remains in excellent condition and quite tight when loaded. Up to the present it has not been necessary to have any work whatever done to the hull or

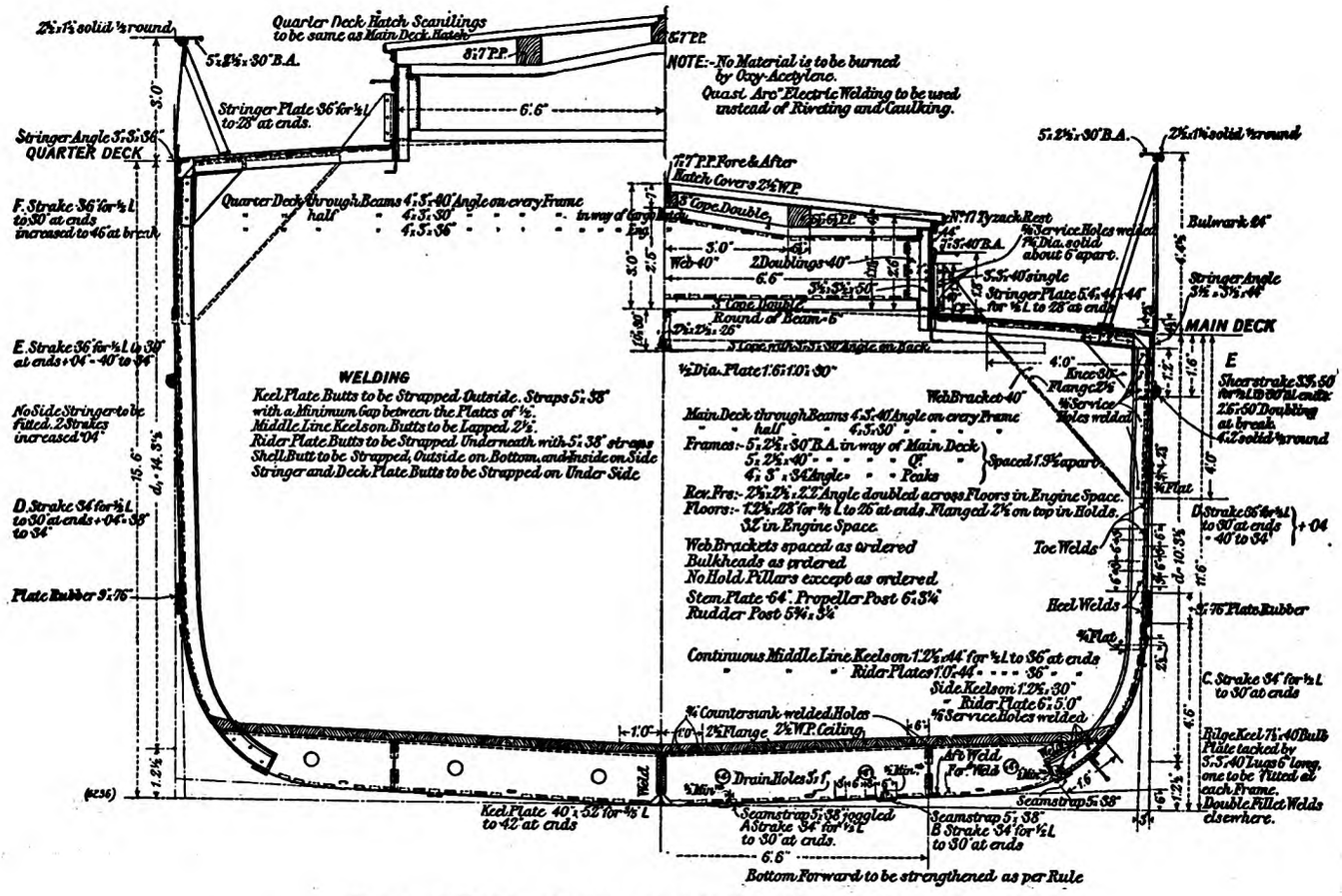
NOTE:-No Material is to be burned by Oxy-Acetylene. Quasi Arc" Electric Welding to be used instead of Riveting and Caulking.
WELDING
Keel Plate Butts to be Strapped Outside. Straps 5"x 38" with a Minimum Gap between the Plates of ½".
Middle Line Keelson Butts to be Lapped 2½".
Rider Plate Butts to be Strapped Underneath with 5"x 38" straps
Shell Butt to be Strapped, Outside on Bottom, and Inside on Side Stringer and Deck Plate Butts to be Strapped on Under Side
QUARTER DECK
MAIN DECK
Bottom Forward to be strengthened as per Rule

Fig. 8.—Midship Section Electrically-Welded Ship Fullagar

welded. All of the welding work was made with quasi-arc welding machines and their special flux covered steel wire was used throughout. Shell plates were joggled to simplify welding operations. All watertight bulkhead connections as well as the bottom plating were continuous welded both inside and out, all other watertight joints were welded continuous on one side and tack welded on the other. On the shell plating the continuous welding was on the outside in all cases. For internal, non-watertight joints and frame construction, tack welding was adopted sufficiently spaced to give a margin of strength over a similar riveted joint.

As is usual in ship construction, framing, bulkheads, and similar parts were assembled and welded on the ground before erection. A very good idea of the construction and appearance of this barge may be obtained by studying Figs. 1 to 5.

The cross channel service gave an excellent opportunity to test out this barge. She had hard usage, having been loaded to capacity with all kinds of war materials, and even grounded a number of times, but in spite of all this she deck. The vessel is in good seaworthy condition, and I consider her much stronger than riveted barges."

THE 1,200-TON OIL BARGE HISCO

About the time of building the *AC-1320*, above referred to, the Tank Shipbuilding Company, Newburgh, N. Y., constructed, under the supervision of Mr. Wm. T. Bonner, the *Hisco*, a 1,200-ton oil barge designed for service in Mexico.

This barge was designed on the Isherwood principle and had a length between perpendiculars of 165 feet 3 inches, a molded breadth of 37 feet 9 inches and a depth of 8 feet 6½ inches. In order to get a direct comparison both from the standpoint of service as well as construction cost, 60 feet of the midship section was welded and the rest of the barge riveted. The shell and deck plating was ¼ inch thick, while the transverse framing members, intercostals and the like were of 5/16-inch plating. Most of the parts were made of plates eliminating many joints found necessary in riveted construction.

After completion, this barge was loaded with a 500-ton

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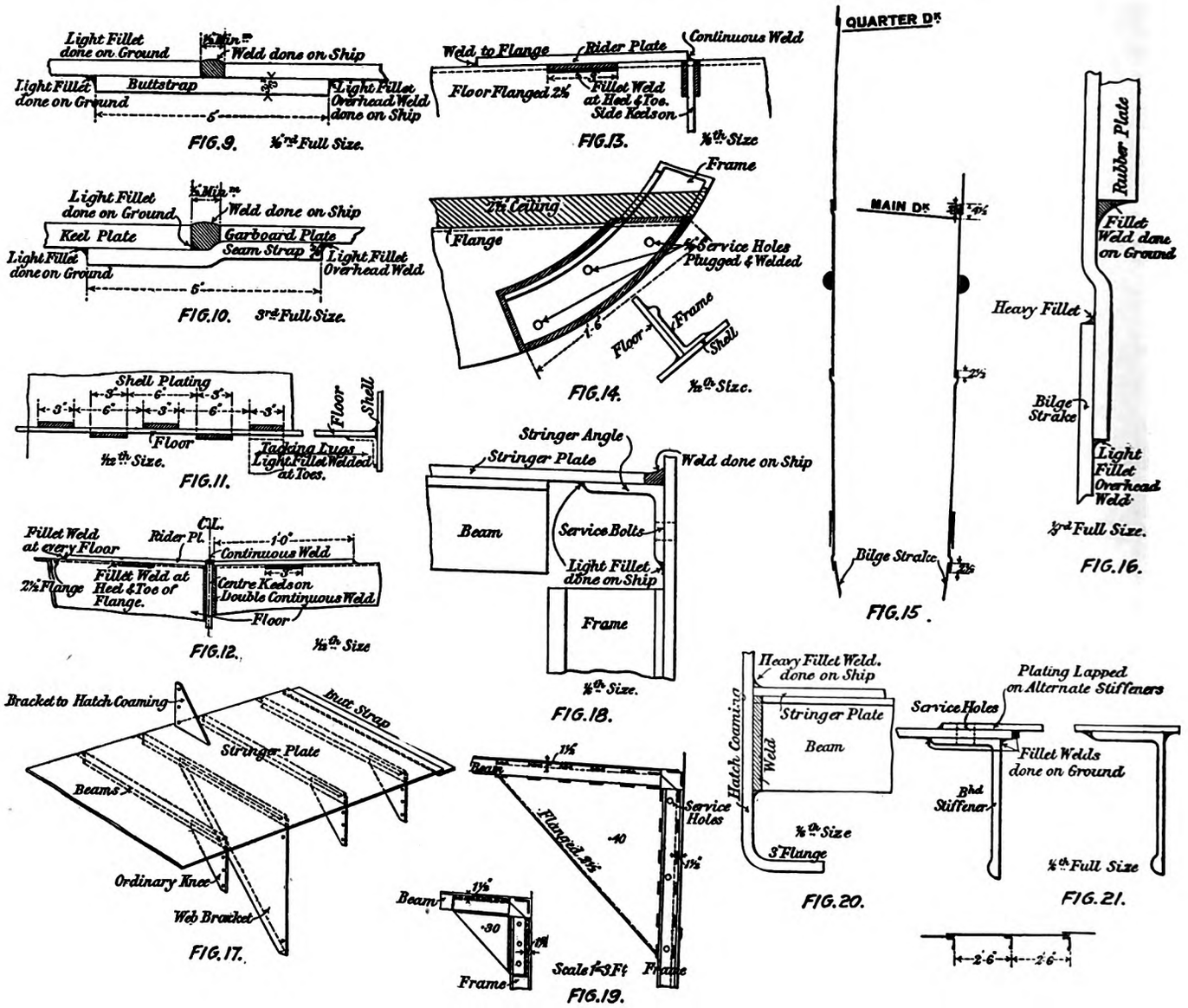

Figs. 9 to 21.—Details of Various Types of Joints Used in Construction of Electrically-Welded Ship Fullagar

cargo, taken to New York where an additional 500 tons of pumping machinery was taken on board. She then left for the 2,500-mile voyage around the Capes to Tampico, where she arrived in due course with hull and cargo in first class condition. After 12 months of service as a bulk oil carrier on the Panuco River, with its rapid currents, heavy winds and tides, it is reported that no repairs have had to be made to this barge.

THE FULLAGAR

In February, 1920, the first all-welded, self-propelled, seagoing vessel, the *Fullagar* was put in commission. This vessel was built by the Cammel-Laird Company, Ltd., Birkenhead, England. She was designed and built as a coast ship, having a length of 150 feet, molded beam 23 feet 9 inches, molded depth 11 feet 6 inches, deadweight capacity 500 tons and cargo capacity 25,200 cubic feet. The propelling machinery is a Cammel-Laird-Fullagar oil engine of 500 brake horsepower at 110 revolutions, having four cylinders 14 inches in diameter by 20 inches stroke. The engine is located in the aft end of ship. The cargo hold is served by two hatches. The fuel oil is carried in side bunkers above the donkey boiler flat. Two masts carry the four derricks which are served by three winches.

The hull is constructed of steel, all in accordance with Lloyd's requirements. There is used in the construction several types of welded joints. Ends of shell plates are joined together by a continuous butt weld, this welding being backed by a light strap. Plate edges are lapped and have a continuous weld on both edges, one being a heavy and the other a light weld, and in places, edges are butted and welded as described above for ends of plating. In all cases, watertightness was obtained by a continuous weld, and non-watertight members were tack welded. Figs. 6 to 21 give details of design and construction. All welding was done with Quasi-Arc welding machines and flux covered steel wire.

The engine foundation, which was also entirely all welded, has furnished an opportunity for many interesting observations. As reported by Mr. A. T. Wall, the original engine installed and later removed was very much too large for this size of ship and yet did not produce the noticeable vibrations that are generally found on similar ships, with riveted engine foundations. This example shows that better distribution of stresses to all parts of the ship can be obtained with a welded construction.

At the time of trial extremely rough weather was encountered with heavy seas producing severe shocks and strains, which she withstood satisfactorily. Quoting from

(*Continued on page* 440)

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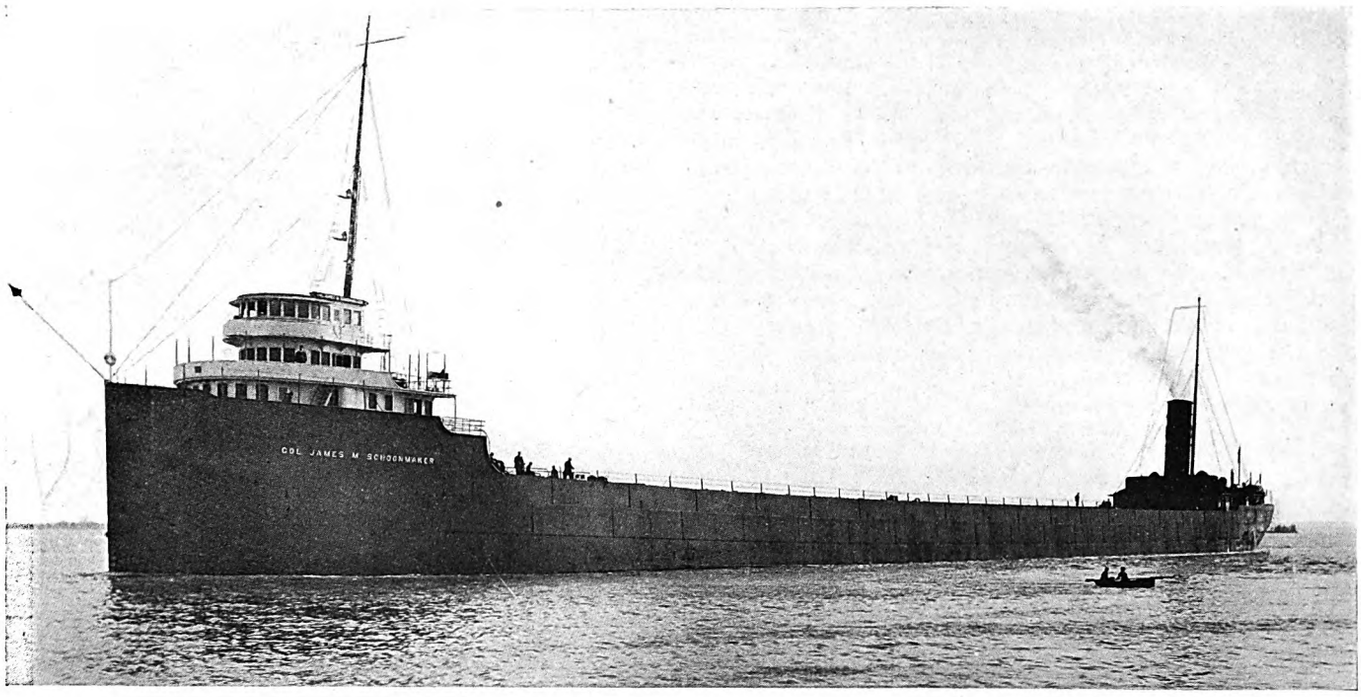

Typical Great Lakes Freighter, Built by Great Lakes Engineering Works: Length Overall, 617 Feet; Beam, Molded, 64 Feet; Depth, Molded, 33 Feet

The Trend in Great Lakes Ship Construction

New Types of Ships and Machinery Being Developed—Refinement in Mechanical and Structural Details Is the Tendency in New Freighters Now Under Construction and Contemplated

LARGER ships, higher powers, higher speeds, changes in engine types from steam to Diesel—along what lines is Great Lakes construction progressing? In one form or another all these changes are being tried out but just what influence any one of them will have on either immediate or future building or operating practice remains for the test of the experiments to determine.

To any one coming from the coast the introduction to steamship operation on the Lakes is a revelation to say the least. This, in spite of the fact that it is admitted as a general proposition that ships cannot be operated in any part of the Seven Seas more economically than here. But to gain from observation an insight into the organized methods which make the shipping industry as effective and productive as it is, is an inspiration to any shipping man.

The design, construction and maintenance of ships on the Lakes play a vitally important part in the operating efficiency of shipping, and it is with this phase of the subject in mind that the following notes gathered from visits to various of the shipping and shipbuilding companies are written.

New Passenger Vessels Under Construction

Under the head of new construction the two passenger vessels now building for the Cleveland and Buffalo Line are perhaps the most outstanding feature on the Lakes at present. These ships when completed will have the distinction of being the largest ever built for inland water transportation as well as having a greater cabin and passenger-carrying capacity than any ships afloat. Originally one of these vessels was intended for turbo-electric drive and designers and operators became very much interested in the project for its possible effect on future Lake designs. With the exception of the propelling machinery, the two ships would have been identical and, with operating conditions similar, a measure of the effectiveness of turbo-electric drive in comparison with conventional side wheel propulsion in extensive use in lower lake passenger service would have been possible.

It was only after serious consideration of the operating difficulties that the project was dropped, but with the possibility of future adoption of electric drive in new passenger designs. The additional deck space, the increased steadiness of the vessel due to side wheels, the decreased danger to propelling machinery from floating obstructions as well as the necessity for keeping the ships in constant service and the lack of dry dock capacity for these ships finally led to the adoption of side wheel propulsion for both vessels. At some later time complete details of these vessels will be published in Marine Engineering and Shipping Age.

Diesel Electric Vessels Soon to Be Put in Service

In another direction progress is being made in the development of craft intended for combined lake, canal and coastwise service as embodied in the two Diesel-electric vessels now nearing completion at the Ashtabula plant of the Great Lakes Engineering Works for the McDougal Terminal Warehouse Company of Cleveland.

These craft are 258 feet length overall, 42 feet beam, 18 feet 9 inches molded depth with decks designed for a bridge clearance of 5 feet above the main deck. They are to be powered with two 375 horsepower Lombard Diesel engines located amidships with General Electric propelling motors

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delivering 500 shaft horsepower located in a motor room aft.

The advantages of this design are in the clear hold spaces and with the balance obtained by installing the heavy machinery amidships the vessels can be readily kept on an even keel. The entire operation of the boats, propelling machinery and all will be under the direct control of the captain —the engineer being required only to run the engines.

Since these vessels are to be used for lake, canal and coastwise service for the carriage of perishable cargo they are designed with two refrigerated and two non-refrigerated holds. Instead of carrying water ballast when traveling light, the tanks are arranged so they can be used to carry fuel oil which is intended for discharge at the terminal in Duluth when the vessels take on a cargo. These boats will have a service speed of about 9 miles.

Larger and Faster Freighters Contemplated

A demand for larger and faster freighters is probably not far distant, for inquiries have been made by at least one of the Lakes shipping companies for ships 633 feet long, 64 feet or 66 feet beam and 33 feet molded depth. Estimates have also been worked out for installing propelling engines delivering 3,300 horsepower in one of the 630-foot type freighters instead of 2,600 horsepower.

The use of surface condensers has been contemplated as a means of eliminating boiler trouble caused by dirty harbor water when used for feed. This would avoid the present necessity of carrying large quantities of fresh water in the deep tanks for harbor service.

The possibility of adopting Diesel engines for propulsion or of equipping boilers with oil burners for Lake service seems remote, although in isolated cases they have been used.

Improvement in Scotch Boilers

Scotch boilers being installed at the Great Lakes Engineering Works in a 12,000-ton freighter, soon to be put in service, indicate as much as any other item of equipment the tendency of the Lakes towards refinement of construction details as the most direct means for creating savings in productive service time and reliability of equipment. These boilers, which are 13 feet 6 inches in diameter by 11 feet 2 inches long with 3 Morison corrugated furnaces, are made with shells 1¼ inches thick in one strake without middle circumferential seam and having the front and back heads flanged from single 1⅛-inch plates, thus eliminating all doubling plates on these heads. With this construction, having the required factor of safety specified by the Steamboat Inspection Service, the allowable working pressure is 180 pounds.

New Ballast Pumping Systems Developed

LOADING and unloading speeds of Lake freighters and the rapid turn around in port are difficult to realize without actually observing the performance, but it has been found by certain operating companies that still greater time saving can be accomplished through improvements in ballast pumping arrangements and these are being incorporated in new vessels under construction.

On a 12,000-ton freighter recently launched, for example, the side and bottom ballast tanks are built up as a number of independent units, having connections through valves and manifolds with each other. Individual tank valves, of the 8-inch angle type, throwing one tank into direct connection with another, are controlled from the ship's deck while manifolds and valves, controlling the pumping as well as pumping equipment, are located aft in the engine room according to usual practice, with certain additional controls making it possible to pump any section of the tank system as desired. The outstanding feature of this system is the time saving made possible by the ability to pump the side ballast tanks independently of the bottom tanks, while the bottom tanks are being filled by gravity, so that the time required for ballasting the ship is materially reduced. This time saving, however, is only one of several advantages claimed for the system.

If for any reason it is desired to use the system as a unit all tank valves can be opened and the tanks completely interconnected. From the standpoint of safety the independent tanks may be used to close off any section of the hull in case of collision or wreckage of the side or bottom of the vessel where the plating has been damaged. That this is of real value every operator probably realizes, for instances of the larger vessels in Lake service dragging in the locks or over bars are not at all infrequent. In such cases the closed tanks act as watertight compartments. Accurate control of ballast, tending to promote stability and fuel economy, is also credited to the system.

The machinery complications incident to a ballast system of this kind have been carefully considered and, although the additional weight of valves and piping together with the maintenance of the system have a bearing on the economic value of it, the greatest speed and safety apparently far overbalance these factors.

New Bearing Metal Introduced to Marine Service

BEARING troubles are by no means uncommon in marine service and any steps that can be taken to prevent burned out bearings or scored shafts or pins, causing expensive delays, deserve a careful investigation. One of the prominent shipbuilding concerns on the Lakes having in charge the construction of a great many of the largest freighters seems to have overcome bearing difficulties on its ships through the use of a new bearing metal adapted from stationary practice. This metal seems to be more or less proof against the usual difficulties experienced in bearings which result especially from over heating, lack of lubrication and other abnormal conditions.

Properties of New Bearing Metal

This metal is a pure alloy consisting of copper and lead and is poured into the bearings in a molten state in much the same manner as babbitt. It is said to have a tensile strength of 11,000 pounds per square inch and three times the compressive stress of babbitt, while it has approximately the same combination of friction and bearing qualities as the latter metal. It is, however, slightly harder to work. So far it has been used in the connecting rod bearings and for similar service in various parts of the machinery.

The first trial given this metal aboardship was in the connecting rod bearings. One crank pin bearing was slack and pounded hard all the way on a trip from Detroit to Duluth. On inspection, after the trip, the bearing was apparently no worse for the pounding and ran through the season.

On the first trip this spring one of the oil lines on this engine broke while the ship was far out in the Lake, so that the crank pin was getting no lubricant at all. The bearings became too hot to cool with water. In spite of this, the engine was driven for fifteen hours without crank pin lubrication until she reached port, where the bearing was overhauled. With the exception of a certain amount of lead which the heat had brought to the surface, and which was scraped off, the bearings were apparently all right. The pin was smoothed up with an oil stone. Since this slight overhauling the engine has been in service without further trouble.

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Increase in Oil Freight Rates Causes Foreign Shipyards to Receive Numerous Inquiries for Tankers

General Adoption of Diesels for Motive Power Predicted

Foreign Taxation of Shipping, Delays in Home Ports and Bill to Regulate Storage of Petroleum Troubling English Shipowners

By W. H. Wendon*

THE phenomenal advance in oil freights—the rates at the latest writing are three-fold those ruling at the beginning of the year—is a natural result of the extraordinary demand for oil tank steamers, and it is not surprising, therefore, that tenders are becoming more and more frequent in connection with vessels of this type. The construction of an oil tanker of 12,000 tons, to be fitted with Diesel engines, is contemplated, inquiries are circulating to build a 10,000-ton oil tanker with steam engines, while another inquiry relates to a 10,000-ton oil tanker to carry molasses and fitted with Diesels.

On the continent, the French Government is understood to be seeking tenders from French shipbuilders for the construction of an oil tanker of about 9,000 tons, and the Rotterdam Dry Dock Company has received a contract to build a tanker of 6,000 tons.

The whole question of the motor-vessel is thus once more to the forefront. The perseverance of the pioneers who bore the brunt of the experimental contracts would seem to have been justified, for it is generally accepted that the internal combustion engine is now a commercial proposition. One well-known and successful United Kingdom shipowner, who has for some time been regarding, from all angles, the question of adopting Diesels, is now convinced that the Diesel engine is the motive power of the future, and in support of his assertion, he has asked for tenders for the construction of a vessel to carry between 7,500 and 8,000 tons. This shipowner furthermore considers that the general adoption of the internal combustion engine will be much quicker than was the transit from sail to steam, or from the compound engine to the triple expansion engine.

French Shipowners Interested

A further illustration of the increased attention which the internal combustion engine is receiving at the hands of shipowners generally is afforded in the case of France, where hitherto the engine has been practically ignored. Only one Diesel-engined vessel—a boat of 10,000 tons deadweight—has, in fact, been ordered in France since the end of the war. It is nearing completion at Nantes, but, no doubt as a result of the pioneer operations of shipowners of other countries with this type of vessel, the passing interest is developing into something more tangible. One leading French shipping company, the Messageries Maritimes, is understood to be contemplating the placing of an order for the construction of a 10,500-ton motor-liner, to be built for its passenger service between Marseilles and the Eastern Mediterranean. In view of the increased interest in the type, it is not too much to expect that other French shipowners will at least make inquiries as to the possibilities of the internal combustion engine as an economical motive power for passenger and cargo ships.

The imposition of taxation on shipping at home and abroad is again a leading question in United Kingdom shipping circles. The subject has from time to time been debated at great length for many months past, but, at this writing, a solution of the problem seems as far off as ever. The offer of the United States Government to exempt from taxation the ships of any nation which similarly exempts United States shipping from taxation in her ports has long been acknowledged by shipping experts on this side of the Atlantic as a highly valuable one, and, in view of the national financial proposals now being dealt with in Parliament, the shipping "powers-that-be" deem it an opportune moment to repeat emphatically that the offer of the United States Government should be accepted.

Sir Frederick Lewis reminds us, that during the past few years it has become a more and more common practice for foreign Governments to tax the earnings of ships touching at their ports. Moreover, in each country an entirely different method of procedure is adopted for calculating such taxation. Sir Frederick, who is a confirmed supporter of the United States proposal in this important matter, points out that owing to the extraordinarily peculiar practice of some countries in looking upon freights as profits, and taxing those freights as though they were profits, it very often results that shipowners pay income tax upon a voyage which may, in fact, have resulted in a loss.

England Greatest Loser

Then again, it has to be borne in mind that, owing to the fact that Great Britain has far more tonnage engaged in the overseas trade than any other nation, any general extension of the practice, if carried to its logical conclusion, would obviously result in a greater amount being paid out in taxation to foreign countries than Great Britain would receive from taxation imposed upon foreign shipping. Sir Frederick Lewis believes that, from the nation's point of view, it would be an advantage that the offer of the United States Government be accepted.

British shipowners would also welcome a step which would both relieve them of the irksome duty of filling up complicated and voluminous returns to the United States tax authorities, and at the same time relieve them from the liability for taxation in this particular direction. In a word, British shipowners would welcome it if only as a first step towards the larger policy of complete immunity of shipping from international taxation. What view the British Government will take remains, of course, to be seen.

Delays in Port

Shipowners in the British Isles are experiencing an anxious time in regard to a matter over which, unfortunately for them, they have very little control, and that is in respect of delays to vessels while in port. Concrete instances, involving serious financial losses, may be cited as illustrations of the delays which shipowners are incurring in British ports as compared with ports abroad.

Thus, a vessel under the management of a leading firm of

*Our British Correspondent.

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shipowners loaded a coal cargo in the United States. She arrived in port at 8 o'clock on a Sunday morning and left again at 6 o'clock on the following Tuesday morning, having loaded 8,800 tons of cargo and bunker coal. This particular instance, moreover, occurred during a holiday week-end. During the same week a steamer of about like capacity loaded a cargo of coal at Cardiff. The vessel, after having waited nine days to get into berth, occupied eight days in loading and bunkering, and did not sail until the ninth day.

Such delays, unfortunately, are not confined to Cardiff, or even to South Wales as a whole; they are authoritatively stated to be typical of a great many other British ports when they are compared with foreign ports which have specialized in the handling of a particular description of cargo. Mr. J. Denholm, a leading Scottish shipowner, is my authority for stating that while, in pre-war days, a boat of 7,000 or 8,000 tons could be loaded in eight to ten days, now a vessel is seldom loaded within three weeks, adding materially, of course, to the cost of working.

To Regulate Storage of Petroleum

The Shipowners' Parliamentary Committee, a body whose members are prominently identified with the Chamber of Shipping of the United Kingdom, have taken up a matter which is of great urgency from the point of view of British shipowners. The trouble revolves round a Bill to amend the Petroleum Acts, and under which a license will have to be obtained from a Secretary of State before petroleum spirit exceeding 1,000 tons or petroleum 5,000 tons can be stored.

The measure has been instituted presumably to ensure that, in the event of another war, the contents of the storage accommodation will be, as far as is humanly possible, immune from attack. The whole point is that naval and military exigencies are apparently to be placed before those of commerce. At present the dock and harbor authorities grant applications for the erection of storage tanks, and it has been possible in the past for work to be commenced on the installation within a few days of the request being made. But, with the decision of a Government Department to be awaited, serious delay will be occasioned, added to which the storage tanks may have to be erected in positions where the danger of attack by aeroplane or otherwise may be minimized, with the result that the cost of installation and pipage might be gravely prejudicial to the trading interests of those concerned.

It is realized, of course, that there should be national reserves of petroleum in protected positions, but it is maintained that such needs should be arranged for by the Government irrespective of commercial requirements. The Shipowners' Parliamentary Committee have therefore decided to oppose the Bill, they being of opinion that it introduces the unsound and disastrous principle that commercial requirements should be subordinated to the naval and military exigencies, and they view with apprehension the attempt to legislate for commerce on the basis of a state of war.

They hold that the removal of commercial stores of petroleum in accordance with defence needs will cause the gravest expense and inconvenience to shipping, and will throw a heavy burden on the consumers of such stores by increasing the cost needed to cover the economic waste which will be caused, in addition to the extra capital charges which must necessarily be incurred by private enterprise in order to provide installations of a capacity capable of satisfying the requirements of defence. In brief, the contention of the Shipowners' Parliamentary Committee is that the necessary reserves should be created by, and maintained under, the control of the Defence Ministries and at the national cost, and that such national stores should be entirely separate from the commercial, thus avoiding the dislocation of private interests.

Training Cadets

The question of apprentices for the sea has been taken up with vigor by Sir William Reardon-Smith (head of the Reardon-Smith Lines), who commenced his sea career at the age of twelve and spent some 33 years at sea, both in sailing-vessels and later in steamers, for twenty years of which period he was in command. I gather that he decided, when starting in business as a shipowner, to carry apprentices in all the steamers owned or managed by him, and to ensure that they obtained a practical knowledge of navigation, combined with a thorough training for sea life during their term of apprenticeship.

The number of apprentices carried in Sir William Reardon-Smith's steamers ranges from four in the smaller vessels to eight in the larger ones—a total of about 200 apprentices for the fleet. The apprentices' accommodation is in the midship house, near the captain's and officers' quarters. The indentures signed are for a period of four years, and wages paid to the apprentices are £8 for the first year, £9 for the second, £11 for the third and £12 for the fourth year, making a total of £40 for the period of apprenticeship. The more promising boys, as they approach the end of their apprenticeship, act as third mates, and on satisfactory completion of their indentures they receive a cash bonus to help defray the expenses of studying for examination as second mate.

Some time ago Sir W. R. Smith's firm subscribed £2,000 as the nucleus of a fund for a nautical school at Cardiff for the training of young boys for the sea, and the fund was subsequently augmented to £20,000. Boys are admitted at the age of thirteen, and the duration of the school course is three years. The first two years are of a preparatory character, and the final year (the cadet course) is devoted to training on lines approved by the Board of Trade. The subjects taught during the two years' preparatory course are English, mathematics, science, geography, with its practical application, physical exercises and manual work, signaling, etc. During the third and last year the instruction is mainly confined to such subjects as have a distinct bearing on the future career of the boys. The cadet course (third year) is recognized for six months' remission of sea service. My object in referring to the foregoing at some length is to afford United States shipowners an idea of the methods adopted on this side of the Atlantic to ensure, for the coming years, an adequate supply of young but efficient officers and men.

May Require Documents in Turkish

A mild sensation has been created in shipping circles here by the intimation that the Turkish authorities are now insisting that all bills of lading, passenger tickets and masters' receipts for vessels loading in Turkish ports shall be worded exclusively in Turkish. The regulation is applied equally whether a vessel is loading for a foreign or a Turkish destination, and whether a passenger has booked to a Turkish destination or otherwise. Orders will also be issued to the master of a vessel in Turkish, and therefore, probably, in a language he does not understand. A vigorous protest against the action of the Turkish authorities in prohibiting documents in any other language than their own will doubtless be registered, for it is easy to imagine what chaos would ensue if every country adopted a similar attitude. Every vessel would have to carry an official interpreter.

Marine Work of all classes, reaching a total of $220,013,463, has been reported by Marine Engineering and Shipping Age as contemplated and contracted for during the first half of 1923. Vessel construction and repair work contemplated and awarded during the second quarter reached a total of $38,459,801; port improvement work, contemplated and awarded, $91,347,628; making a total of $129,807,429 as against $90,206,034 for the first quarter.

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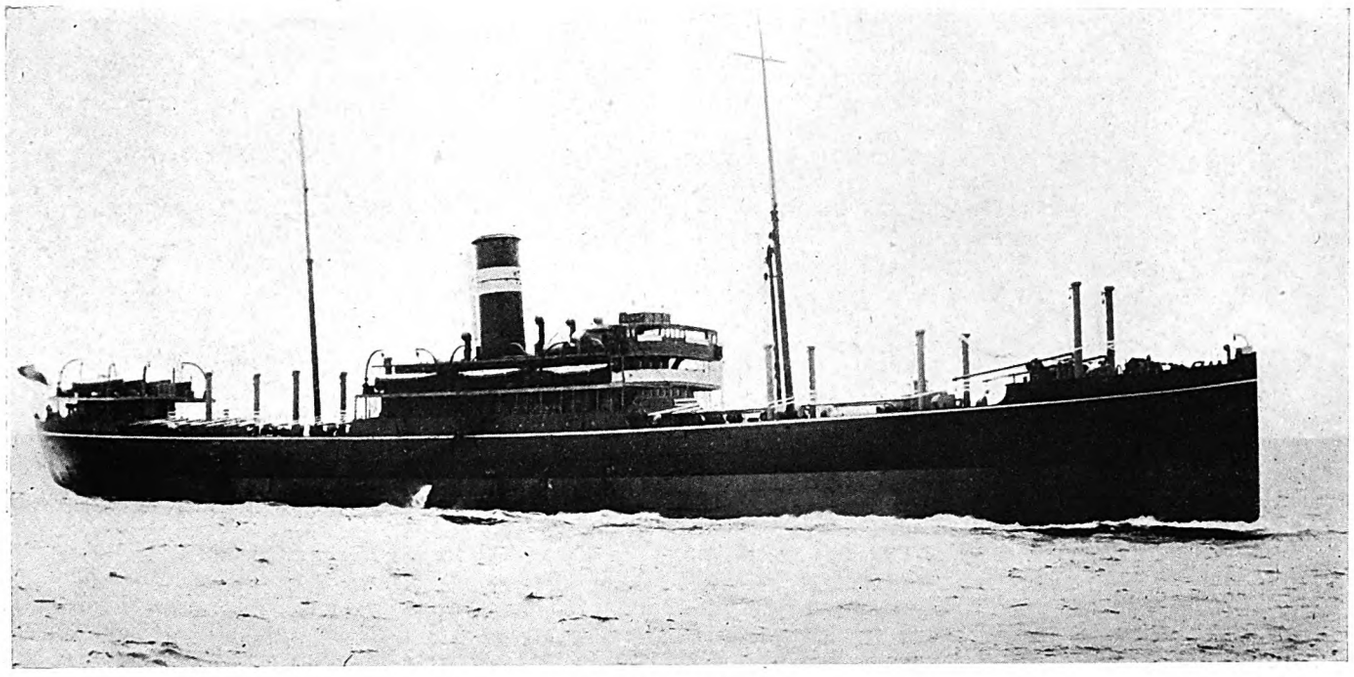

Motorship Dalgoma

The Largest Two Cycle Engined Motorship

Sulzer Two Cycle Diesel Engines of 3,200 Brake Horsepower Built in Scotland for Motorship Dalgoma

By Our Special London Correspondent

IN Europe, the completion of cargo and even passenger ships equipped with four cycle Diesel engines is becoming so common that very little notice is taken of every new vessel of this class that is placed in commission. The number of two cycle engined craft is still, however, very small, so that special attention is paid by engineers, shipowners and shipbuilders to boats in which propelling machinery operating on this principle is fitted.

Probably one of the most interesting ships of the class is the *Dalgoma* which sailed on her maiden voyage to the East early in June. She was built to the order of the British India Steam Navigation Company, which possesses more steamers than any other British firm, and is one of a series of motor craft constructed for this concern, the majority of which however are equipped with four cycle engines.

Engines Built in Scotland

In the *Dalgoma* are installed the biggest motors of the Sulzer two cycle type that have yet been fitted on a ship, and in view of the fact that half a dozen of the leading British marine engine builders have taken up a license for the manufacture of the Sulzer Diesel engine, it is specially noteworthy that the machinery of this ship was built by a Scottish firm, Messrs. Alexander Stephen and Sons. The only other Sulzer engined ship constructed in Great Britain was provided with machinery by the Swiss manufacturers so that the *Dalgoma* represents something of a new departure in British shipbuilding.

She is 448 feet in length overall with a length between perpendiculars of 430 feet, the beam being 54 feet 6 inches, the depth 32 feet 6 inches, and the deadweight, including fuel, about 9,300 tons.

The two engines are each designed to run in the ship at 85 revolutions per minute at which speed the total power developed is 3,200 brake horsepower or about 4,300 indicated horsepower (2,150 indicated horsepower for each engine). It may be added, however, that exactly similar engines have been built for installation in another ship, but the speed has been increased to 100 revolutions per minute giving an output of 2,000 brake horsepower. Bearing this in mind, the fact that the total length of the engine room is only 48 feet is worthy of consideration in any comparisons that are made between two and four cycle plants. It is true that an additional space is required in the form of a recess at the after end of the engine room for the turbo blowers, but this is comparatively small.

This engine has four cylinders, whereas a corresponding four cycle motor would necessarily have six. The cylinders are 680 millimeters bore with a stroke of 1,100 millimeters and it may be remarked that with the engines running at normal speed the mean indicated pressure in the cylinders varies between 90 and 100 pounds per square inch. The mean effective pressure referred to brake horsepower would therefore be in the neighborhood of 73 pounds per square inch which is not excessive.

Control Station at Top of Cylinders

An unusual feature of the installation lies in the location of the control station at the level of the top of the cylinders. The reason for the employment of this system is that the whole of the control gear, valve mechanism, fuel

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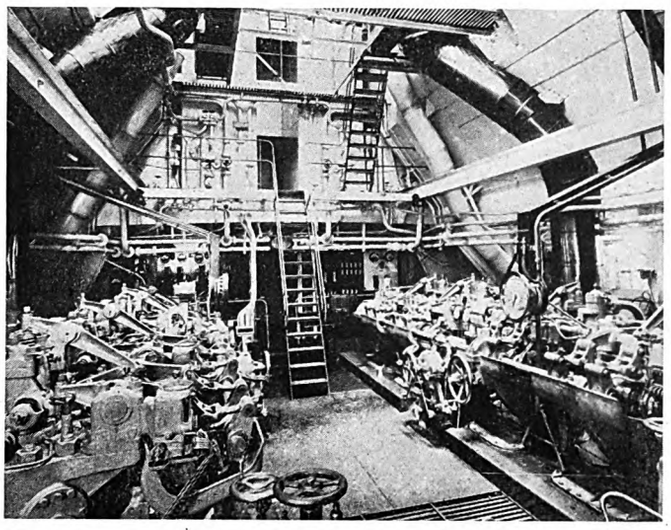
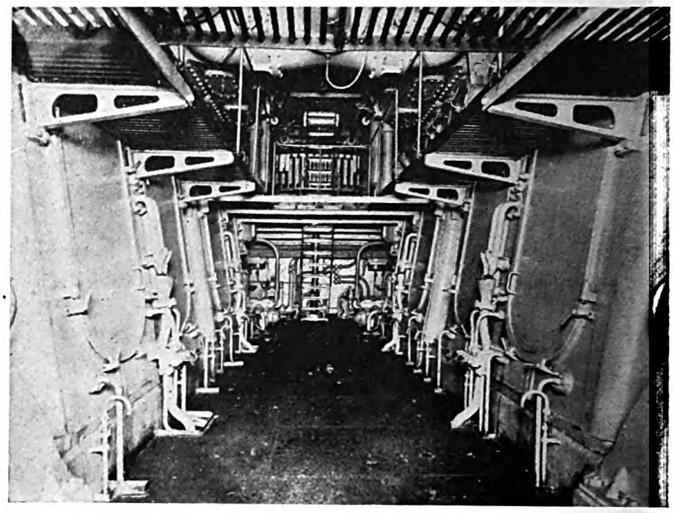


Control Station at Tops of Cylinders



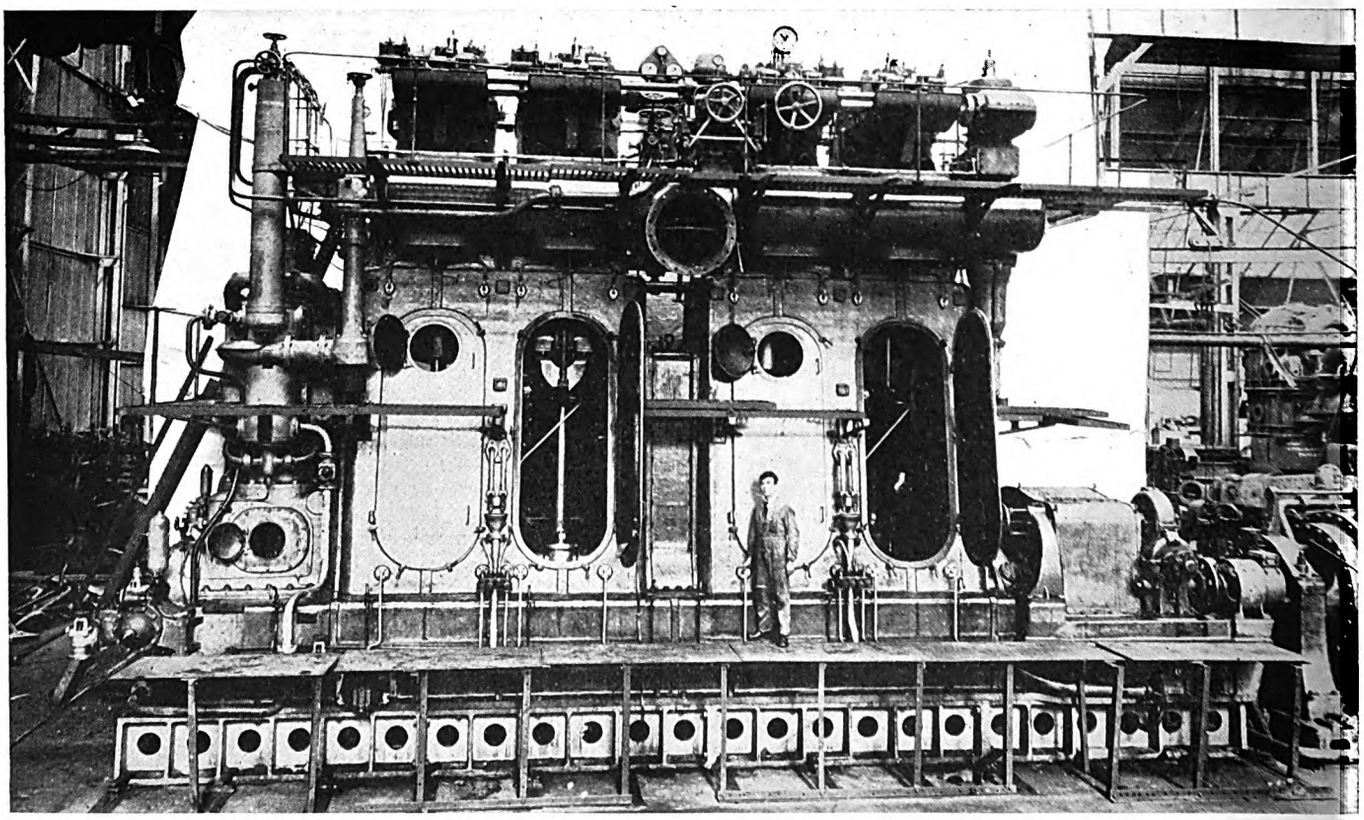
The Engine Room at Floor Level

pumps and, in fact, the most important parts of the machinery are at the top of the engine and not at the bottom. On the other hand there is a large amount of auxiliary machinery on the engine room floor, so that it is questionable whether there is much to be gained either way.

In general design, the engines are of the well-known Sulzer type and as they have been so frequently described it is scarcely necessary to give further detailed particulars. In one point, however, they are unusual in the adoption of turbo scavenging pumps, instead of having the normal piston pumps driven by a crank on the main engine crankshaft. This is only the second ship in which such an arrangement has been fitted and is the first British vessel where it is employed.

As previously mentioned, there are two turbo blowers arranged in a recess at the after end of the engine room. Both of these blowers deliver into one large pipe, from which branches are taken to each of the propelling engines. The turbo blowers are driven by electric motors of about 230 brake horsepower running at the high speed of 2,750 revolutions per minute. Air is drawn down from the deck to the blowers and is discharged to the main trunk at a pressure of about 2 pounds per square inch above atmospheric pressure.

The output of these blowers is high, being about 17,000 cubic feet per minute at a pressure of 1.8 pounds per square inch. It was found on actual trials that the power needed from the electric motor was in the neighborhood of 175 brake horsepower, one set, of course, supplying all the air necessary for the scavenging of both main engines. This power is equivalent to about 5 percent of the total engine output and for given cylinder dimensions it will be seen that this amount is virtually added to the shaft



1,600 Brake Horsepower Stephen-Sulzer Engine

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horsepower developed, by detaching the scavenging pumps from the propelling motors.

The arrangement of auxiliary machinery differs to a considerable extent from that usually adopted in four cycle engined vessels. There are only two electric generators, in spite of the fact that all auxiliaries are electrically operated. These necessarily have to be of large size and they comprise 410 brake horsepower four cylinder two cycle Sulzer engines each driving a dynamo of 260 kilowatts at 220 volts.

In view of an increasing tendency on the part of some builders to utilize high speed Diesel machinery for auxiliary purposes, it may be stated that these engines run at only 200 revolutions per minute. There has lately been some trouble experienced with auxiliary machinery mainly on account of the high speed and it is by no means unlikely that there will be a gradual reversion to the relatively low speed auxiliary in the future in spite of its higher cost and the additional weight and space occupied.

It is somewhat surprising to find two electrically driven auxiliary compressors installed in the engine room. As is well known, in most ships, one auxiliary is ample for all purposes. The installation of an additional set purely for safety in the case of a very remote emergency hardly seems to be warranted under present day conditions. Each of these compressors is driven by a 150 brake horsepower electric motor. They are, of course, not required in normal circumstances and even when entering and leaving port only one is needed for at most an hour or two.

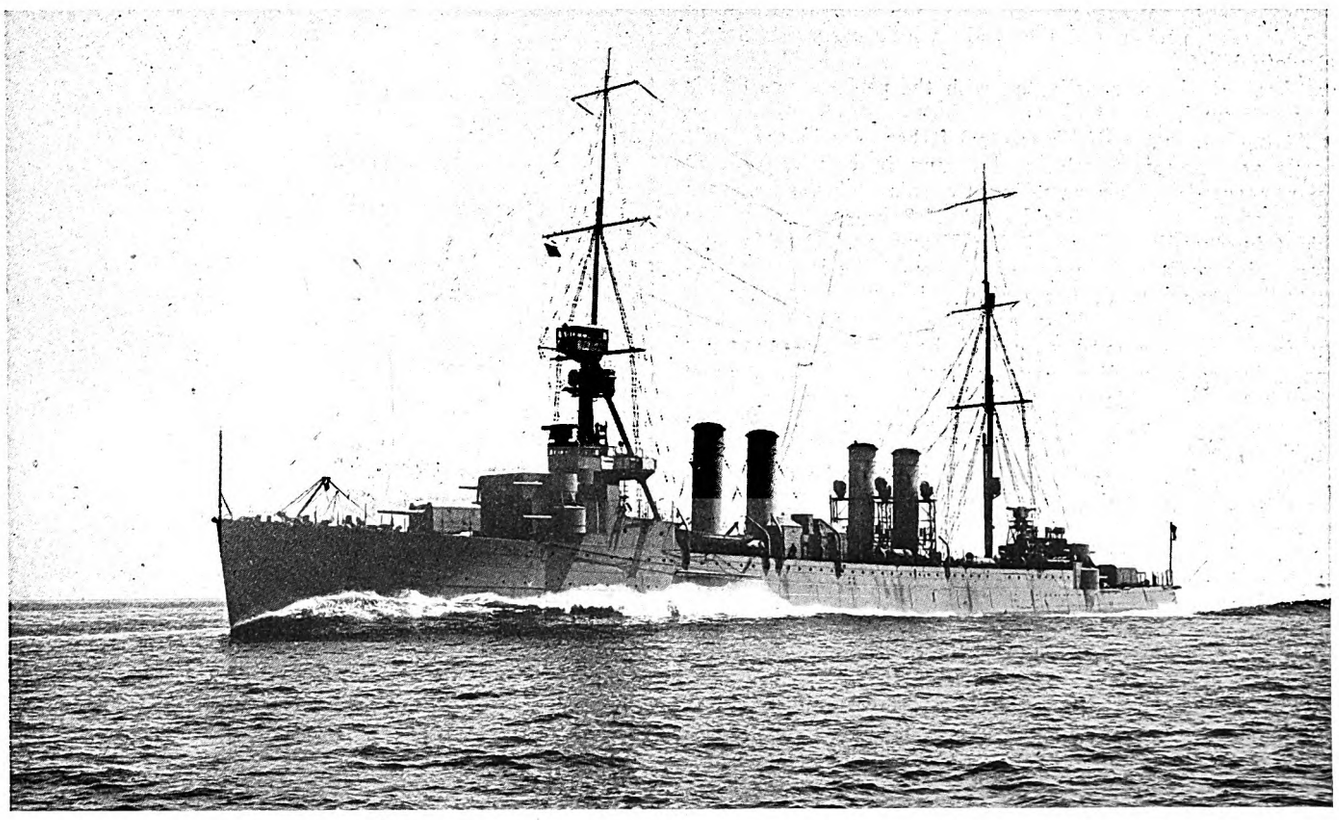
The propelling engines drive their own three-stage air compressors and, in addition, a main lubricating pump, a bilge pump and a small vertical high pressure pump for supplying lubricating oil at about 250 pounds per square inch to the crosshead pins. The jacket and piston cooling pumps are electrically driven, only one of the latter being provided but there are two piston cooling pumps, delivering water to the pistons at about 25 pounds per square inch. These pumps are of the centrifugal type and in order to ensure that they shall always run drowned, they are supplied with fresh water from a large tank located high up in the engine room. The piston cooling water, after being forced through the pistons by the centrifugal pump, drops into a tank below the engine room floor, when it is picked up by a separate plunger pump and thus raised to the gravity feed tank which also acts as a cooling pump. Sea water cools the jackets.

Scout Cruiser Detroit Completes Official Trials

Vessel Built by Bethlehem Shipbuilding Corporation, Ltd., Equipped with Turbines Developing 100,000 Shaft Horsepower

THE United States scout cruiser *Detroit*, which has just completed exhaustive trials off the coast of Maine, has established a record by developing the highest power ever attained by any vessel constructed in the United States. The *Detroit* was built for the United States Navy by the Bethlehem Shipbuilding Corporation, Ltd., at its Fore River Plant, Quincy, Mass.

The vessel is in effect a very fast and powerful destroyer, having a length of 555 feet, a breadth of 55 feet and a normal load displacement of 7,200 tons. She carries twelve 6-inch



United States Scout Cruiser Detroit Undergoing Official Trials

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rapid fire guns of the very latest model, four 3-inch anti-aircraft guns capable of firing into the air at any angle up to 90 degrees, ten torpedo tubes fitted to fire the latest model 21-inch long range torpedoes, and more than two hundred mines which can be launched over her stern and laid in a very few minutes while running at full speed.

The vessel is fitted to carry airplanes which can be launched from revolving catapults while running with, against or across the wind; also with high power radio apparatus, wireless telephones, submarine signalling apparatus, electric steering gear, laundry, workshop, hospital, etc.; in fact, she is in all respects the last word in design, construction, equipment and armament that lessons of the late world war have shown to be essential for carrying out duty to which she would be assigned in time of war.

Power for lighting the vessel and for operating the searchlights, wireless and various other electric-driven auxiliaries is generated by four 100-kilowatt turbo-generator sets.

PROPELLING MACHINERY DEVELOPS 100,000 HORSEPOWER

The propelling machinery of the *Detroit,* designed and constructed throughout by the Bethlehem Shipbuilding Corporation, Ltd., developed 100,000 shaft horsepower on trials, which is sufficient to drive the vessel through the seas at a speed of 35 knots, or nearly 41 land miles per hour. This speed would take the vessel from New York to Liverpool in 80 hours as compared with about 120 hours required for the fastest passenger liner now afloat.

Describing briefly the main propelling machinery, the vessel is fitted with twelve oil-fired watertube express type boilers, three being located in each of the four watertight compartments, and operated under forced draft. There are two watertight engine room compartments amidships in which are located the twelve powerful Curtis-type marine steam turbines. These turbines operate at a speed of 2,500 revolutions per minute which is reduced, through reduction gears on each of the four propeller shafts, to 400 revolutions per minute. The excellent economy obtained in connection with the oil fuel consumption as compared with that of the older coal burning installation, is quite remarkable.

Some idea of the enormous power and capacity of the propulsion machinery installed on the *Detroit* may be obtained from the following figures:

At full speed, the shaft horsepower developed is approximately three times as much as fitted to the recent battleships. Oil fuel is consumed at full speed at the rate of 100,000 pounds per hour, which requires 624,000 cubic feet of air per minute to effect combustion.

The twelve express type boilers contain 65 miles of steel tubes, in which steam is generated at the rate of 1,500,000 pounds per hour at a pressure of 265 pounds per square inch.

The main turbines are fitted with approximately 32,000 blades, some of which rotate at a speed of eight miles per minute.

Four main condensers, located in the engine rooms, require about 70,000,000 pounds of sea water per hour to condense the 1,200,000 pounds of steam from the main turbines.

Milwaukee Makes 36 Knots

THE *Milwaukee,* second of the new type scout cruisers built by the Todd Shipyards Corporation, developed a speed of 36 knots, equal to 41.4 statute miles, her engines developing 97,000 shaft horsepower on her recent trials. She is the fastest vessel of her type in the world.

Admiral J. K. Robison, chief of the Bureau of Steam Engineering, pronounced the trial as highly successful and Captain W. C. Asserson, U. S. N., commander of the *Milwaukee,* said he was delighted with the performance of his new command.

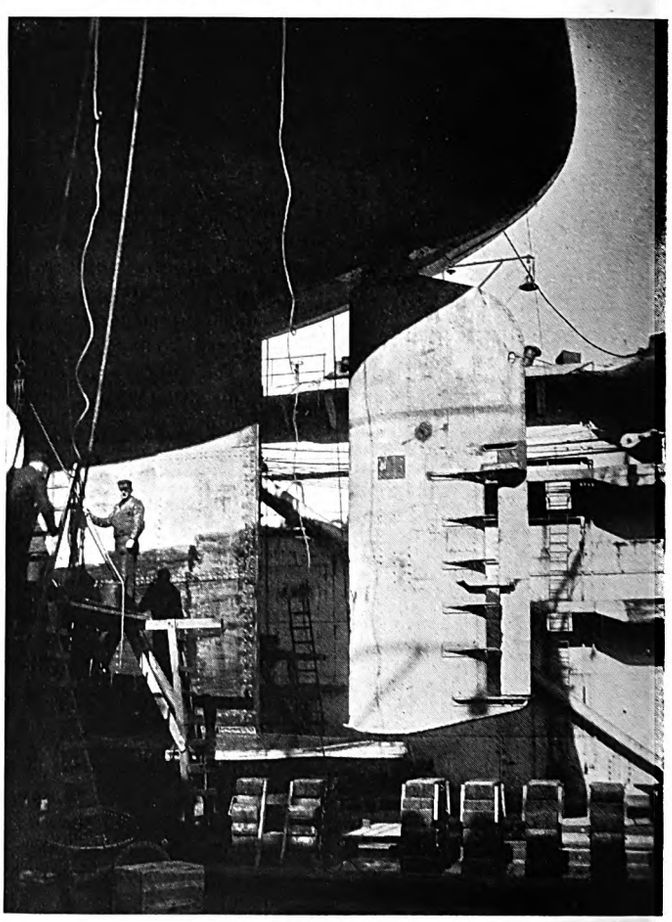
At 8.45 a. m., the *Milwaukee* left her pier in the Todd yards at Tacoma, Wash., and swung into the stream at quarter speed. After rounding Brown's Point, speed was increased until the cruiser logged 21.2 knots, the average maintained until she reached Port Townsend. Off Marrowstone Light, where the presence of the Pacific is first manifest, the beginning of her real speed trials commenced.

Slowly at first, the long, narrow cruiser nosed her way out into the straits, cutting through the water at a constantly increasing speed until she was reeling off 35.2 knots. The wind velocity at this speed was so great that some of the official observers were almost blown bodily against rails and bulkheads.

After nearly an hour's run, during which the same high speed was maintained while the *Milwaukee* raced down the straits, all but one of the remaining steam nozzles were turned on, and before Port Angeles was astern, the cruiser was tearing through the water at the record-breaking speed, for a vessel of her type, of a trifle faster than 36 knots. The cruiser's bow was kept headed toward the mouth of the straits until Race Rocks were astern and then put about and headed for home.

The *Omaha,* first of the Todd-built scout cruisers, recently clipped 20 hours and 56 minutes off the record for the run between Honolulu and San Francisco. She steamed the distance of 2,103 miles in 75 hours and 11 minutes, the previous record, held by the steamship *H. F. Alexander,* was 100 hours and 31 minutes.

Flettner Deflecting Rudder



Flettner Deflecting Rudder on Hamburg American Line Motorship Odenwald. This Rudder Was Described in Our April Issue

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Care and Upkeep of Marine Watertube Boilers

Maximum Efficiency Can Only Be Obtained by Keeping the Power Plant in First Class Physical Condition

By A. Ross Mackay*

IN the era of prosperity immediately following the war it was sufficient that a vessel be operated without excessive cost in overhauling or repairs, but in these days, when freight rates have dropped to a point at which operating costs are barely covered, rigid economy must be practiced, if the vessel is to continue in service. As the boilers are the heart of the ship, it is most important that they be operated to give the greatest efficiency, which can only be accomplished by keeping them in first class physical condition.

The handling of the fires or oil burners to give the lowest temperature of funnel gases and the least amount of excess air commensurate with complete combustion; heating surfaces kept free from heavy soot deposits by the periodical use of the steam lance or blowers; the prevention of corrosion, pitting, scale formation and tube loss by careful observation of the feed and boiler water, are all recognized as good practice aboardship, whether the boilers be of Scotch or watertube type. To a certain extent, also, the practices that govern the inspection, overhaul and repair of Scotch boilers are applicable to the watertube boiler. Any engineer who has operated an installation of Scotch boilers efficiently and economically should be all the better able to operate a watertube installation, when he has mastered the details of construction of the boilers and the best methods to be followed in keeping them in condition for such operation.

External Inspection

In inspecting and overhauling watertube boilers the engineer will, of course, be governed by the length of the stay in port and the time that can be accordingly given to this most important duty. If the stay in port is to be brief, requiring that the boilers shall be held all ready for getting the fires under way, a close inspection can be made of the boilers externally. The condition of the tile and insulating material between the side generating tubes and casing plates can be tested for tightness by light blows of the knuckles on the plates, a hollow sound indicating, of course, an air space which will require filling at the first available opportunity. In similar manner the insulation of the furnace walls can be tested and inspection made of the bolts securing the walls. All tube doors, inspection doors and cleaning doors can be gone over, to see that they fit against their frames and that the latches are so adjusted that they hold the doors tightly closed, preventing any air leakage from this source. The straps covering the joints in the casing plates should also be examined for the same reason. For that matter, the casings at these points can be tested with a torch or lighted candle when the boiler is in use, air leaks being temporarily calked with asbestos putty or other suitable material.

In the event that the boilers cannot be emptied, and that, accordingly, the internal condition of the tubes, headers and drums cannot be noted, a very thorough inspection can be made of the fire side of the heating surfaces, the furnaces and baffles, in addition to the casing inspection aforementioned. In this condition, also, the boiler can be inspected for any leakage at the tube or nipple seats.

Consult Drawings Before Making Changes

Too much care cannot be exercised in the inspection and overhaul of the furnace, not only for the reason that a defective wall will affect the combustion, and consequently the boiler efficiency, but that the boiler structure and casings may be seriously damaged, if exposed to the intense heat of the furnace. As the boiler manufacturer usually furnishes each vessel with a very complete set of drawings, it would be well to make a thorough study of the furnace design, noting the provision made for the expansion of the brickwork, the method of securing the brick in place and the different materials used to insulate the walls and floor. Most of us are prone to experiment—especially when some one else bears the expense—and the marine engineer is no exception. It should be borne in mind, however, that the design of the furnace, and the use of certain materials in the design, are the outcome of many years of close application to the science of burning coal and oil efficiently, and that therefore no change in design or material should be made without careful consideration of the possible consequences.

If any departure from the given design is contemplated, or if there is any doubt in the mind of the operator as to the condition of the furnaces, the matter should be taken up with the manufacturers, who will undoubtedly give him the benefit of their knowledge and experience. In this connection it might be stated that at least one watertube boiler company maintains a trained corps of visiting engineers who board the vessels equipped with their boilers, make inspection of the boilers and discuss with the operating personnel their care and upkeep, this service being free of charge. Needless to say, such service is not altogether in the interest of the operator, as the manufacturers are thus assured that their product is not only giving perfect satisfaction, but that it is receiving the care and attention that should be accorded any valuable piece of equipment.

Baffles

A careful inspection should be made of all baffles, to see that they are in correct position and securely fastened. If the boilers are of Babcock and Wilcox type, particular attention should be given the baffle forming the furnace roof. This baffle is of molded tile fitted to rest on the row of tubes directly over the furnace. It extends from the front headers to the rear vertical baffle and directs the furnace gases to the first pass, between the vertical baffle and the rear headers. Any leakage in this horizontal baffle will allow the gases to short circuit into the last pass, thence to the boiler uptake. As the condition of this baffle can be observed from the furnace and the cleaning doors at the boiler sides, and, in the case of the latter, when the boiler is under steam, there is no excuse for its being operated in defective condition, once the defect has been noted.

As the tubes over the furnace are really part of the furnace, it follows that they should be inspected in conjunction with the furnace. These tubes are subjected to the greatest temperatures, and are also subject to destruction from floating matter lodging within their interior. They should be carefully examined for distortion and "blisters," especially the latter. These blisters are generally caused by the lodging of loose scale in the tube and the building up, over the scale, of matter usually held in suspension, until a point is reached at which the tube becomes overheated directly under the scale and, due to the pressure within, bulges outward towards the furnaces.

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BLISTERS

It often happens that on internal inspection the blistered tube shows no sign of scale or other deposit at the point of failure, so the blister is attributed to some other cause. In reasoning thus, however, the point is entirely overlooked that the movement of the wall of the tube disturbs the deposit, which is swept from the tube by the violent action of the water and steam within the tube, leaving no indication of its late presence. In somewhat the same manner tubes that have blistered from oil deposit very often show no sign of oil locally.

The question naturally arises: When is a blistered tube due for renewal? On this point authorities and services differ, so the operator will have to be guided largely by his own or others' experience in this connection. In certain services the slightest blister or bulge is sufficient to condemn a tube, while in others the operator uses his own good judgment as to whether or not the wall of the tube has been sufficiently injured to warrant renewal. There are many factors to be considered, such as the number of tubes blistered and the amount of new tubes available, the fact that the boiler will have to be emptied to permit of the renewal, the length of the stay in port or the voyage ahead. In case of any doubt, however, the tubes should be renewed; otherwise it may be necessary to renew the tube at sea and under extreme difficulty.

INSPECTION OF TUBES

In inspecting the headers and tubes internally it is advisable to remove the entire lower row of handhole caps in the front and rear headers, so that a thorough examination can be made of the entire row, the mud drum and mud drum nipples. The condition of these tubes will determine whether or not the caps to the entire row directly over it should also be removed, and even the row next above that, all according to just what must be done in the way of cleaning the inner surfaces. For inspection only, it is sufficient to remove a handhole cap here and there in each horizontal row, thus avoiding the needless waste of gaskets.

Tubes can generally be cleaned by the use of the brushes or expanding spoon-type scrapers furnished by the manufacturers, but if hard scale has formed, usually in the lower rows only, turbining will be necessary. During this operation the turbine cleaner should not be allowed to remain for any length of time at one spot in the tube, otherwise the surface of the tube may be damaged, rendering it more liable to corrosion. Care must also be taken that the tubes, headers and mud drum are thoroughly cleaned out after turbining, to avoid the danger from floating scale described above.

A THOROUGH CLEANING METHOD

Should the boiler be badly scaled and time permit, a thorough cleaning out may be given by the following method:

Drain the boiler, close it up, with the exception of a lower handhole, through which pour about 30 gallons of kerosene into the mud drum. Put the handhole cap in place and open the air cock on the steam drum. Through a ¾-inch pipe, tapped into a special handhole cap in the end of the mud drum, allow a steam jet to blow into the boiler until such time as the condensate has risen well over boiler working level, or about three-quarter glass, which should take from 36 to 48 hours, when the steam can be shut off, the pressure relieved and the boiler drained. Just as soon as possible the handhole plates should be removed and the tubes thoroughly scraped and washed out. It will be found that the scale will come away clean from the metal surfaces. Vaporizing the boiler by this method has been found very effective, not only in loosening scale but in giving the boiler a thorough cleaning out.

The inspection of the internal fittings of the steam drum scarcely needs mention, beyond perhaps a word of caution with regard to the zinc plates. These plates are usually suspended in baskets of perforated sheet metal, thus making provision for the reception of the disintegrated zincs. Should these baskets get adrift from their fastenings, or should they be incorrectly replaced after work has been performed in the drum, portions of disintegrated zinc are apt to pass through the downtake nipples into the sections, causing tube losses.

PITTING

The steam drum should be wire brushed and wiped out with kerosene to enable a proper inspection to be made for any sign of pitting or other action. In the event that pitting is discovered, which generally occurs at the working water level where the nipples and tubes enter the drum, the pitted portions should be cleaned down to bare metal and the entire internal surface of the drum given a coat of French zinc. Pitted tubes can also be treated with a thin coat of French zinc and kerosene. A deep pit in the drum shell should be filled with cement or one of the special preparations devised for just such purposes. While such measures help prevent further action within the drum the real remedy lies in preventing the entrance of entrained air with the feed water. There is no sense in endeavoring to prevent pitting by the method described, which is only palliative, at best, if no steps are taken to locate and remedy the cause of the trouble.

In outlining some of the economies which may be practiced in the care and upkeep of marine watertube boilers, we have purposely passed over details of overhaul and repair common to most boilers. No one appreciates more than the marine engineer the importance of having the power plant in first class condition, and his splendid record of achievement in break-down repairs at sea has been made principally by the happening of the unexpected and not from neglect or oversight on his part.

An Analysis of Claims of the Electric Drive Over the Geared Drive

(*Continued from page* 419)

As to the backing power, this feature has no practical value, as it bears only on the maximum speed of the vessel that can be eventually attained in the astern direction and not on the actual ability to stop and maneuver. Furthermore, too much power applied to a propeller, with the blades working on their backs, produces cavitation and nullifies the purpose intended.

In reply to the last point, it can be said that in all modern geared turbine installations there are generally fitted special impulse turbines of rugged design, and the argument against derangement of same is entirely fallacious, there being no record of a single case where trouble has been experienced of this nature when so fitted.

ELECTRIC DRIVE MORE EXPENSIVE AND HEAVIER

The electric drive is both more expensive and heavier, which varies with the class of vessel.

For a vessel of the scout cruiser type the weight is about 300 tons more, with the cost about 25 percent greater.

CONCLUSION

From the foregoing it is evident that the electric drive is far from fulfilling the promises of its advocates, and it is this which possibly explains their reluctance to publish anything other than theoretical figures pertaining to same.

Some comparisons have been made by the electrical advocates using the old direct drive steam installations for this purpose, but which have no particular bearing on the subject, on account of this earlier drive having for some time not been considered for new construction.

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Influence of Speed on Economy of Motorships

Faster Ship is at a Disadvantage Because of Initial Cost of Larger Power Plant and Increased Consumption of Fuel

By L. B. Chapman*

IN fixing the characteristics of a new design, comparative studies are often made to determine the influence of the following factors on the operating expenses:

1. Type of machinery.
2. Size of ship.
3. Speed of ship.
4. Speed of handling cargo.
5. Length of voyage.
6. Percentage of full load capacity carried per trip.

A number of these items have been taken up by the writer in previous articles in MARINE ENGINEERING AND SHIPPING AGE. In this article it is proposed to investigate in a systematic manner the effect of various speeds on the operating expenses of a cargo ship of given dimensions.

It should be borne in mind that this comparison is for ships especially designed and powered for the speeds stated. It is not intended to indicate that a ship should be run at a speed less than that corresponding to its maximum power. If, for example, a speed of 10 knots can be obtained with a 9-knot ship without any increase in first cost or machinery weight, calculations of the operating expenses will quickly show that there is a distinct gain in favor of the 10-knot ship. As pointed out in the article, the high speed ship is handicapped not so much because of the increase in fuel costs as in reduced deadweight capacity and increased capital charges.

The ship selected for this comparison has the following characteristics:

Length between perpendiculars	420 feet
Beam	57 feet
Molded depth	35 feet
Loaded draft	27 feet

The block coefficient has been decreased slightly with increased speed, giving a slightly finer ship for the higher speeds. Speeds of 9, 10, 11, 12 and 14 knots have been selected and the effective horsepower has been carefully calculated from model tank data. The propeller efficiencies have been taken from Taylor's $p\delta$ diagrams and the shaft horsepower has been increased 20 percent over that expected on trial to allow for increased power in service. All five ships are twin screw and the revolutions per minute have been made 115 for all the ships, which gives the 14-knot ship an advantage of about 10 percent in propeller efficiency over the 9-knot ship. If the revolutions per minute for the 9-knot were reduced to improve the propeller efficiency, the cost and weight of the machinery would increase, resulting in little if any overall gain.

The particulars of the five ships are tabulated in Table I. It will be observed that the gross deadweight decreases as the speed is increased, due to the heavier machinery weights in the faster ships. The net cargo deadweight also decreases, due to the decrease in the gross deadweight and to the increase in the fuel weight required with increased horsepower.

The data and results of the operating expenses for a 5,000 mile voyage are given in Tables II and III. Line 17 in Table III shows that the freight rate to give a 10 percent return on the investment increases with speed and that the profit for a freight rate of $7.03 per ton increases rapidly as the speed is decreased.

CAPITAL CHANGES DETERMINING FACTOR

The 9-knot ship has a net cargo deadweight capacity 20.5 percent greater than that of the 14-knot ship, due to the saving in machinery and fuel weights; yet the 14-knot ship makes 3.7 more trips per year and carries 11,500 more tons (13½ percent) of cargo per year because of its greater speed. The 14-knot ship, however, loses out because of the greater capital charges (line 5, Table III), caused by the increased first cost of the larger power plant, and because of the increased fuel cost (line 6). The engine crew for the faster ship has been slightly increased by the addition of more oilers and a machinist-storekeeper. The port charges of the faster ship are also greater than those for the slower ship, due to the greater number of turn-arounds effected per year.

If the speed were reduced below 9 knots, in all probability an optium speed would be found that would give a lower freight rate or a greater return on the investment than shown by the 9-knot ship. This comparison has not been carried below 9 knots, as it is felt that speeds lower than this and powers below 1,500 shaft horsepower are not to be recommended for a ship of this size.

The foregoing comparison clearly shows that there is no advantage in building a general cargo ship for speeds greater than 9 or 10 knots unless special inducements are offered in increased freight rates. When passengers, fruit, or refrigerated cargoes are carried, of course higher speeds are demanded and the earnings per ton of deadweight are greater.

The costs of the machinery, per shaft horsepower used in the above comparison have been assumed arbitrarily and may not agree with all types of Diesel machinery. They are, however, comparable and any reasonable change in the machinery costs will not affect the relative position of the ships in the table.

Table I.—Particulars of Ships

1.	Sea speed in service	9	10	11	12	14
2.	Block coefficient	.80	.79	.78	.76	.74
3.	Displacement (tons)	14,500	14,300	14,100	13,800	13,400
4.	Net tonnage (estimated)	4,700	4,650	4,600	4,500	4,400
5.	$V/\sqrt{L}$	.44	.49	.54	.59	.69
6.	Model E. H. P.	740	1,000	1,290	1,620	2,600
7.	Calculated S.H.P.+20% reserve	1,500	2,000	2,500	3,100	4,800
8.	Hull weight (tons)	3,900	3,890	3,880	3,870	3,830
9.	Machinery weight (lbs. per S.H.P.)	630	600	580	570	560
10.	Machinery weight (tons)	420	535	650	790	1,200
11.	Gross deadweight (tons)	10,180	9,875	9,570	9,140	8,370
12.	Calculated fuel for 5,000 miles + 20% (tons)	205	250	280	320	425
13.	Stores, provisions and water (tons)	50	50	50	50	50
14.	Net cargo deadweight (tons)	9,925	9,575	9,240	8,770	7,895
15.	Number of engine crew	12	15	15	15	16

Table II.—Data for a Voyage of 5,000 Miles

1. Speed in service	9	10	11	12	14
2. Days on run + 5%	24.3	21.9	19.9	18.2	15.6
3. Fuel per S.H.P. per hour in service	.44	.44	.44	.44	.44

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4. Fuel per hour at sea .....(lbs.)	660	880	1,100	1,365	2,110
5. Fuel per day (tons)	7.07	9.43	11.80	14.65	22.6
6. Rate of stevedoring (tons per hatch per hour)	30	30	30	30	30
7. Rate of stevedoring (tons per 10 hrs.).....	1,500	1,500	1,500	1,500	1,500
8. Calculated time in port + 10%	14.55	14.10	13.55	12.85	11.60
9. Days per single trip	38.85	36.0	33.45	31.05	27.20
10. Single trips per year	8.63	9.30	10.0	10.80	12.30
11. Tons of cargo carried per year..	85,500	89,000	92,400	94,700	97,000
12. Cost of hull.....	$720,000	$720,000	$720,000	$720,000	$720,000
13. Cost of machinery	$280,000	$350,000	$420,000	$510,000	$750,000
14. Total cost of ship.	$1,000,000	$1,070,000	$1,140,000	$1,230,000	$1,470,000

A summary of the data is given in Table IV. Line 5 shows the shaft horsepower installed per ton of cargo deadweight. It is seen that the cost of the ship increases with the increase in speed; yet the carrying capacity of the ship decreases. Line 7 in Table IV gives the annual operating expenses per ton of cargo carried per 1,000 miles traveled and shows the increase in expenses as the speed is increased.

In the foregoing comparison all the installations have been made twin screw, the cargo handling rate has been kept the same and all other factors kept constant where possible in order that speed should be the only variable. This does not work to the best advantage of the ships in each case but it does give a fairer comparison of speed than would be the case if other factors were varied.

In conclusion, the writer wishes to make clear that the comparison given above is based on assumed ships and theoretical conditions and the results are intended only for comparative purposes. They are not intended to apply to a particular isolated case.

Table III.—Annual Operating Expenses

1. Speed in service (knots)	9	10	11	12	14
2. Depreciation (5%).....	$50,000	$53,500	$57,000	$61,500	$73,500
3. Insurance (5%).....	$50,000	$53,500	$57,000	$61,500	$73,500
4. Repairs, maintenance, overhauling (4%)....	$40,000	$42,800	$45,600	$49,200	$58,800
5. Total capital charges (14%)	$140,000	$149,800	$159,600	$172,200	$205,800
6. Fuel used at sea at $12.20 per ton.....	$18,100	$23,400	$28,600	$35,100	$53,000
7. Fuel used in port at $12.20 per ton.....	$1,530	$1,600	$1,650	$1,690	$1,740
8. Lubricating oil at 75c. gallon	$1,860	$2,450	$2,980	$3,660	$5,540
9. Wages of crew.....	$36,000	$38,340	$38,340	$38,340	$39,540
10. Subsistence at 70c. per man per day.....	$8,950	$9,700	$9,700	$9,700	$9,950
11. Tonnage dues and port charges	$29,150	$30,800	$32,400	$33,600	$36,550
12. Brokerage and management at 50c. per ton..	$42,750	$44,500	$46,200	$47,350	$48,500
13. Stevedoring at 70c. per ton	$119,500	$124,500	$129,000	$132,500	$135,500
14. Annual operating costs..	$398,000	$425,000	$449,000	$465,000	$536,000
15. 10% on investment...	$100,000	$107,000	$114,000	$123,000	$147,000
16. Total	$498,000	$532,000	$563,000	$588,000	$683,000
17. Rate per ton of cargo to give 10% return on investment	$5.83	$5.98	$6.10	$6.21	$7.03
18. Profit for a rate of $7.03 per ton.....	20.2%	18.7%	17.3%	16.2%	10%

Table IV.—Summary

1. Speed in service (knots)	9	10	11	12	14
2. Rate per ton to give 10% return	$5.83	$5.98	$6.10	$6.21	$7.03
3. Profit for a rate of $7.03 per ton	20.2%	18.7%	17.3%	16.2%	10.0%
4. Cost per ton gross D.W.	$98.50	$108.50	$119.00	$134.50	$175.50
5. S.H.P. per ton of cargo D.W.	0.151	0.209	0.271	0.353	0.61
6. Cost of fuel used at sea per 1,000 cargo ton-miles .....(cents)	4.25	5.27	6.20	7.40	10.90
7. Annual operating cost per 1,000 cargo ton-miles..	$0.93	$0.96	$0.975	$0.982	$1.105
8. Percentage of year at sea	57.5%	56.0%	54.5%	53.0%	52.6%

Distinctive Tendency Toward Self-Insurance Noted

Merchants Who Adopt Such a Course Run Grave Danger—Lack Facilities for Obtaining Prompt Knowledge of Disasters and Minimizing the Results

By "Bordereaux"

THERE is a slow but nevertheless steady growth in self-insurance among various classes of merchants in this country, and underwriters are regarding it with considerable concern. Within recent months there has been a noticeable movement in that direction on the part of large importers, especially chain department stores whose import business is chiefly confined to the movement of goods from Western Europe to the United States. Experiments in self-insurance are being made in the shipment of merchandise over the established transatlantic routes where voyages are relatively short and the best types of vessels are employed. It is an experiment of very doubtful advantage, for everyone familiar with the North Atlantic is aware of the uncertainty of the elements and of the nature of the severe and disastrous storms that frequently rage there.

In the long run, the law of average will certainly take its toll of the man who takes chances. There are innumerable accounts which have shown underwriters a profit, year in and year out, but where a sudden disaster has wiped out years of accumulated profit and left a debit balance. Other accounts seem fated to share in every possible bad fortune at sea; and these bring the insurer nothing but losses. The underwriter carries the good with the bad, because he operates by the law of average. Should he have a disastrous year on the North Atlantic he can make up for it by better luck in other parts of the world, but the individual self-insurer has no such spread of risk, which is absolutely fundamental to a proper working out of this inexorable law. It is economically unsound for shipowners or merchants to risk their profits in an experiment where the cards are stacked against them; and particularly is this so in a branch of insurance such as marine, where the profits are notoriously small. Rates on imports of general cargo from Europe are lower at the present time than for years, which reflects the relative freedom from serious losses. The shipper has the benefit of these low rates; why, then, should he run the risk of incurring a severe loss which will wipe out his insurance reserve and leave him with a charge on the wrong side of the ledger? Again, the self-insurer is without the machinery necessary for obtaining prompt notice of disaster, which permits the underwriter to take steps to minimize the loss or preserve the venture. Furthermore, in cases of general average there are many complicated situations which arise, and unless the proper steps are taken loss and embarrassment may readily result to the shipowner or shipper, depending upon the circumstances involved in the case.

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Hague Rules Endorsed

THE idea of a uniform ocean bill of lading has appealed strongly to the Chamber of Commerce of the United States. At its recent annual meeting, the Transportation Group adopted the following resolution, which was proposed by D. Roger Englar, who represented the Association of Marine Underwriters of the United States:

Whereas, The Chamber of Commerce of the United States at its tenth annual meeting, held in Washington, D. C., in 1922, put itself on record as indorsing The Hague Rules, 1921, as a step in advance and asked Congress to enact legislation for The Hague Rules with such interpretations as may be deemed necessary; and

Whereas, These rules have been further modified and are now before us in the form of the Brussels Draft International Convention for the Unification of Certain Rules Relating to Bills of Lading; therefore, be it

Resolved, That this chamber approves the said Brussels Draft International Convention as an improvement over The Hague Rules and asks Congress to enact legislation putting the said Draft International Convention into effect.

Restriction in English Clauses

ENGLISH underwriters announce important alterations in their hull contract. They have decided not to include hereafter the four-fourths "running down" clause, nor protection and indemnity risks in time policies, except in case of liners and other special service vessels in which such risks have regularly been included in the past. This agreement applies to all insurance placed on English conditions.

In Great Britain it is generally regarded that the granting of full collision cover and the writing of P. & I. risks has extended beyond the bounds of underwriting safety. It has always been accepted that one-fourth of the collision risk ought to be run by the owner. The latter joins with other owners in mutual associations, and shares with them the claims that arise from writing vessels in common. These associations play the leading role in the adjustment of collision liability claims. They also cover protection and indemnity risks in full. The English authorities insist that "in eliminating the one-fourth collision liability and the whole of P. & I. risks from the marine policy, underwriters are assuring the associations of a continuance of business and, at the same time, assuring themselves of the continuance of the excellent service which these associations undoubtedly render the market."

Carrier's Floating Policy

LIABILITY under a general floating marine policy taken out by a carrier covering goods to be shipped by the latter was gone into recently in a case before the New York Supreme Court, Appellate Division, 199 New York Supp., 46. The court held that under such conditions as arose in this case the shipper is entitled to sue the insurer for loss sustained under such a contract and need not be relegated to their claims as general creditors against the bankrupt carrier.

The suit was on appeal from the Supreme Court. It was brought by Nicholas P. Young and another, as co-partners, against the St. Paul Fire and Marine Insurance Company and another. The plaintiffs were engaged in the bagging business, and shipped 298 bales of gunny bags with the Inland Waterways Steamship Corporation which had a policy with the several insurance companies covering goods shipped by it "for account of whom it may concern." The goods were destroyed by fire due to lightning. The insurer resisted payment on the ground that the carrier was the insured and the party through which all rights of shippers in the first instance should be enforced, and that the equitable rights of plaintiffs under the policy were limited to their proportion of such sums as might be recoverable by the carrier, or its receivers. The receivers of the carrier raised the contention that the policy was one of reinsurance, to reinsure the carrier for losses it might be obligated to adjust with the shipper, and for which it should be liable, and that therefore the plaintiffs had no interest in the proceeds of this insurance, and were not entitled to recover in this action, being only general creditors of the carrier. The court held that these contentions were without merit, and that the insurance on the bags was effected for the benefit of the plaintiffs.

Leviathan's Insurance

WHEN the world's largest vessel, the *Leviathan,* passed out of the Newport News yards, where she had been reconditioning for the past thirteen months, her insurance automatically expired. Thereafter she was without coverage, except as the risk of the Shipping Board boats are regularly taken care of by the Government. Her policy had been for $2,500,000, written in Syndicate "C." It attached April 10, 1922. The expiration was given as of May 20, 1923, "or until the vessel sails from Newport News." The underwriters had but comparatively few claims to meet during the cover period, and the insurance operation, taken as a whole, was profitable to the insurers and eminently satisfactory to the vessel's owners.

Marine Fire Hazards

AT the recent annual meeting of the National Fire Protection Association, held at Chicago, the report of the Marine Fire Hazards Committee was accepted and adopted as submitted without a change. This was a well-earned tribute to the fine work done by Mr. S. D. McComb and his associate committeemen. The committee was continued, and will now proceed to devote its attention to problems respecting hazardous commodities, gas engines and gasoline boats. They made certain recommendations along these lines, which were tentatively adopted, but they will require to be gotten into permanent shape. Hazardous cargoes come under the jurisdiction of the Interstate Commerce Commission. The committee earnestly invites criticism and suggestions from steamship owners, to the end that the handling of these subjects may be as comprehensive and satisfactory to all concerned as is at all possible.

Improper Recording of Bill of Sale

IN the case of the *Jean L.,* 286 Federal Reporter, 727, the claimant had a bill of sale on the vessel, which was recorded in the office of a State court, that was offered in evidence at the time of the trial in an attempt to show a prior lien but the Court said a bill of sale on a vessel is not admissible as evidence of title where it was not recorded in the office of the collector of customs, in the home port of the vessel as required by Rev. St. Sec. 4192 and there was no evidence that the claimant had any knowledge of the existence of the bill of sale. The recording of the bill of sale in the office of the clerk of a State court does not give constructive notice to a subsequent lien claimant, since the provisions of the United States laws and not those of the State apply to transfers of vessels or interests in them and especially where there is no State law authorizing bills of sale of personal property to be recorded by that court.

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Protective Coverings for Shipbuilding Purposes: Paints

By Horace Holden Thayer *

Continuation of a series of articles containing information regarding shipbuilding materials and their uses that is not readily obtainable from shipbuilding handbooks and other generally available sources. The articles are not intended to be a complete exposition of the subject but will be found to contain items of value to the various classes of workers in this field who have to deal with these materials from the materials point of view.

IN a consideration of paints as a protective covering for shipbuilding purposes we will find it advantageous to group them in several classes, such as

Priming paints
Bottom compositions
Interior paints, general
Exterior paints, general
Paints for special services
Varnish and shellac

Before taking up any one of the paint mixtures it will be well to present specifications of the materials which go to make up the vehicle, or liquid portion, of the paint. They are oil, which generally should be pure linseed oil, turpentine, volatile mineral spirits and a drier. Linseed oil is what is known as a drying oil, that is, an oil which when spread out in a thin film readily takes up oxygen from the air and changes to a tough and elastic substance. Specifications for these, as drawn up in 1918 by the War Service Committee of the Paint Industry for shipbuilding purposes, may be considered as representative of good practice. These specifications, together with the same specifications for varnish, are given below. Shellac is merely gum shellac dissolved in alcohol.

In addition to linseed oil, China wood or tung oil and soya bean oil are of value in some paints. The former has great cohesion and good water proofing properties, while the latter is particularly of value for its adhesive properties. The use of soya bean oil makes a slower drying paint.

Raw or Refined Linseed Oil

It shall be absolutely pure, well settled oil of best quality. It shall be perfectly clear at a temperature of 60 degrees F. and shall not show a loss of over 0.2 percent when heated to 212 degrees F., or show any deposit of "foots" after being heated to this temperature. It shall conform to the following requirements:

	Maximum	Minimum
Specific gravity at 15.5 degrees/15.5 degrees C.	0.936	0.932
Or specific gravity at 25 degrees/25 degrees C.	0.931	0.927
Acid number	6.	.....
Saponification number	195.	189.
Unsaponifiable matter, percent	1.50	.....
Refractive index at 25 degrees C.	1.4805	1.479
Iodine number (Hanus)	.....	170.

These specifications agree with standard specifications D77-21T of the American Society for Testing Materials except that the latter use only the specific gravity at 15.5 degrees C. and have 0.931 as the minimum, and call for a minimum refractive index of 1.478.

Boiled Linseed Oil

It shall be absolutely pure, well-settled linseed oil boiled with oxides of manganese and lead. It shall conform to the following requirements:

	Maximum	Minimum
Specific gravity at 15.5 degrees/15.5 degrees C.	0.945	0.937
Acid number	8.	.....
Saponification number	195.	189.
Unsaponifiable matter, percent	1.5	.....
Refractive index at 25 degrees C.	1.484	1.479
Iodine number (Hanus)	.....	168.
Ash, percent	0.7	0.2
Manganese, percent	.....	0.03
Lead, percent	.....	0.1

These specifications agree with standard specifications D77-21T of the American Society for Testing Materials except that the latter use only the specific gravity at 15.5 degrees C. and have 0.936 as the minimum, call for a minimum refractive index of 1.478, and specify a maximum of 0.3 percent calcium.

Turpentine

This specification applies both to the turpentine that is distilled from pine oleoresins, and commonly known as gum turpentine or spirits turpentine, and to the turpentine commonly known as wood turpentine that is obtained from resinous wood, whether by extraction with volatile solvents, by steam, or by destructive distillation. The bidder should state whether gum spirits or wood turpentine is furnished.

The turpentine shall be clear and free from suspended matter and water. The color shall be water white. The specific gravity shall not be less than 0.860 or more than 0.875 at 15.5 degrees C. The refractive index shall be not less than 1.468 or more than 1.478 at 15.5 degrees C. The initial boiling point shall be not less than 150 degrees C. nor more than 160 degrees C. Ninety percent of the turpentine shall distill below 170 degrees C. The polymerization residue shall not exceed 2 percent and its refractive index at 15.5 degrees C. shall not be less than 1.500.

The American Society for Testing Materials standard specifications D13-21T are approximately the same as this, but in some particulars they make a distinction between the requirements for gum spirits and those for wood turpentine.

Volatile Mineral Spirits

This shall be a hydrocarbon distillate, water white, neutral, clear and free from water. It shall have no darkening effect when mixed with basic carbonate-white lead.

When 100 cubic centimeters are submitted to continuous distillation in an Engler flask with a condenser 22 inches long at an angle of 30 degrees with the horizontal, and cooled with water, the first drop shall issue from the condenser at a temperature of not less than 265 degrees F. and 97 percent shall distill below 470 degrees F.

When 100 cubic centimeters of the distillates are placed in a glass crystallizing dish 2½ inches in diameter in a steam bath maintained at a temperature of 212 degrees F., and evaporated, not more than 2/10 of 1 percent of residue shall remain after 2½ hours. The flash point shall be not less than 85 degrees F. when determined by the closed Abel tester method, the test being made in the usual official manner.

Drier

It shall be composed of lead, manganese, or cobalt salts, or a mixture of any of these elements, combined with pure linseed oil and thinner. The thinner shall consist of approximately 75 percent volatile mineral spirits and 25 percent turpentine. It shall be free from adulterants, sediment and suspended matter. Resins or "gums" other than resin may be used at the option of the manufacturer (but the presence of resin in any form shall be cause for rejection). The drier shall not flash below 35 degrees C. (95 degrees F.) in an open tester. When the drier is thoroughly mixed with linseed oil that will not break under 315 degrees C. (600 degrees F.) in the proportion of 5 volumes of drier to 95 volumes of oil, no curdling shall result within 2 hours after mixing, and the mixture when flowed on a clean glass plate held in a vertical position, shall dry in not more than 18 hours at a temperature between 15 degrees and 35 degrees C.

Varnish

The material shall be the best long oil varnish. It must be resistant to air, light and water. The manufacturer is given wide latitude in the selection of raw materials and processes of manufac-

*Member of the firm of Rossell & Thayer, naval architects and marine engineers, Philadelphia, Pa.

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ture, so that he may produce a varnish of the highest quality. Preference will be given to the rapid drying varnishes.

The varnish shall be clear and transparent.

The color of the varnish shall be no darker than that of a standard color solution, made by dissolving six grams of pure powdered potassium bichromate in 100 cubic centimeters of pure concentrated sulphuric acid (Specific gravity 1.84). Gentle heat may be used if necessary to perfect the solution of the bichromate. The standard color solution and a sample of varnish shall be placed in clear thin-walled glass tubes of the same diameter. The color comparison shall be made by placing the tubes close together and looking through them. The tubes used for this test shall be 5/8 to 13/16 inch in diameter, and shall be filled with the liquids to a depth of at least one inch.

When tested in an open tester, the varnish shall not flash below 95 degrees F. (35 degrees C.).

The film test shall be made on a film of varnish flowed on one side of a panel of bright tin which is 0.0125 to 0.0158 inch thick and about four inches wide by six inches long. The panel shall be thoroughly cleaned with benzol before applying the varnish. When the panel is placed in a vertical position and maintained at a temperature of 70 to 90 degrees F. (21 to 32 deg. C.), the varnish must set to touch at points within one inch of the side and top edges of the film, in not more than five hours and must dry hard in not more than twenty-four hours, to a clear hard glossy film.

The panel shall then be allowed to dry for a further period of not less than five days, and then brought to a temperature of from 70 to 75 degrees F. The panel with the varnished side on the outside, shall then be rapidly bent double over a rod 1/8 inch in diameter. The varnish film must neither crack nor flake at the point of bending.

A basswood panel shall be filled with a coat of drop black in oil, thinned with turpentine and drier, and allowed to dry for at least ten days. The filler must have suitable body to give proper brushing, flowing and covering properties. A coat of varnish shall then be applied, allowed to dry for forty-eight hours and lightly sandpapered. A second coat of varnish shall then be applied and allowed to dry for seventy-two hours. The panel shall then be inclined at an angle of forty-five degrees, and a gentle stream of cold tap water allowed to flow for eighteen hours down the middle of the panel. After wiping off, with a chamois skin, any deposits due to tap water the varnish must show no appreciable whitening, dulling or other defects. A small stream of boiling distilled water will then be allowed to flow down another portion of the panel for twenty minutes. The water will be siphoned through a small glass tube directly from a container in which it is boiling, onto the surface of the panel, in such a manner that there will be no appreciable lowering of the temperature of the water before it touches the varnish film. The siphon delivery tube will be in a plane nearly parallel to the plane of the panel, so that the impact of the water will not tend to break the film. The varnish shall show no appreciable whitening and no more than a very slight dulling, or other indications of marked deterioration, either when observed immediately after removing from the water, or after drying for two hours.

The varnish shall be applied, in three coats, to two unfilled panels of maplewood. The panels must not be less than 5½ inches wide by 18 inches long by ¾ inch thick. The first coat of varnish, after drying indoors for three days, shall be lightly sandpapered with No. 00 sandpaper before the application of the second coat. The second and third coats of varnish shall each be allowed to dry three days indoors, but neither coat shall be sandpapered or rubbed. A protective coat of varnish (not for test purposes) shall be applied to the back and edges of the panels. The duplicate panels shall then be placed outdoors at an angle of 45 degrees to the vertical and facing the south.

The durability of the varnish on the test panel must be equivalent to that of an approved varnish exposed under the same conditions.

The American Society for Testing Materials has standard specifications for a number of the more important paint pigments, which are of value as quality standards. They also have standard specifications for tung oil.

Priming Paints

The first coat of paint applied to the bare steel, wood or other material is the priming coat, and it naturally first demands our attention. A good priming paint is very important.

Protection of Steel

Steel and iron are painted to protect them from corrosion which results from exposure to moisture and is accelerated by the presence of salt and other elements or conditions which induce galvanic action. A priming paint for steel work should therefore be as impermeable as possible, should contain nothing soluble in water or that would attack the steel, should be a non-conductor of electricity and should contain nothing that would act with the steel to set up galvanic action. If it is of a nature to neutralize attacking acids in the air or water, so much the better. In addition to these qualifications the paint should adhere tenaciously to the surface and should form a good and hard foundation for subsequent coats. A soft film as a priming coat will result in the cracking and alligatoring of the subsequent coats.

The steel should be scraped or wire brushed clean of mill scale and dirt and made thoroughly free of oil, and it should be thoroughly dry. Lubricating oil or palm oil is sometimes rubbed over the surface to prevent corrosion during shipment and this will prevent the adherence of any paint. One of the best removers of such oil is benzine.

The oil used in priming paints for steel work should be pure linseed oil, preferably entirely raw. No mineral oil or non-drying oil of any kind should be used in it, as they prevent the paint's becoming sufficiently hard to give a good foundation for subsequent coats. Linseed oil when used as a coating without pigment makes a film that is too soft, as well as being somewhat porous and permeable, but when used with a pigment the film will dry hard. Boiled linseed oil produces a paint film which is harder and resists the softening action of water better than raw linseed oil, and this renders the former more desirable for outer coats, particularly where the coating is constantly in contact with water.

Red Lead

Red lead is made by melting lead metal in furnaces and oxidizing it to litharge (PbO), a buff colored oxide. This when pulverized and again heated to the proper temperature takes on more oxygen and changes to red lead (Pb_3O_4), though there will usually be a small percentage of litharge unconverted. Too high a heat will result in a transformation of the red lead back to litharge again. The difficulty of producing a red lead entirely free from litharge may be readily imagined. Litharge is easily decomposed and enters into other chemical combinations, and it also, when in any considerable amount, acts on the oil causing the paint to become ropy and resulting in the objectionable caking of the pigment when the paint is allowed to stand. An excessive amount of litharge in red lead indicates that the pigment has not been ground finely enough and thus the presence of coarse particles which interfere with obtaining a good uniform paint film. Red lead produced by the oxidation of white lead is often called orange mineral, and a more complete oxidation and a resultant low percentage of litharge is more easily obtained by this process, but it is not always so obtained. One paint manufacturer states the composition of their orange mineral as 95.71 Pb_3O_4 and 4.29 percent PbO.

No priming paint thus far evolved has been proved by actual experience to equal a paint composed of pure red lead and pure linseed oil in the marine field. There is no other paint that makes such a hard, tenacious film. It is a good protection against electricity and acids. It stands high as regards impermeability, having a good thick film with a maximum of pigment. Red lead and pure linseed oil paint contains nothing soluble in water, and it dries rapidly through and through. The bright orange red color is also of value on a steel surface as showing up defects in the application of the coating.

An objectionable feature in the use of pure red lead paint is the fact that with the use of the red lead powder generally obtainable, the pigment soon settles to the bottom and cakes in a manner which prevents its proper mixing up again. The reason for this has been mentioned. This fact has in the past required that the paint be mixed fresh for the particular work in hand. In order to simplify this process one man-

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ufacturer has for some years produced a red lead ground in linseed oil and sold in paste form, and quite recently they have gone a step farther and produced a liquid red lead paint. This has been made possible by the use of finely ground and highly oxidized red lead containing not less than 97 percent of Pb_3O_4. The use of the pigment in paste form or the use of the liquid red lead paint obviates another objectionable feature, which is the danger of poisoning from the red lead powder when proper precautions are not taken by the user.

Paint specifications adopted in 1917 by the United States Shipping Board Emergency Fleet Corporation were prepared by Dr. P. H. Walker of the United States Bureau of Standards in collaboration with Dr. H. A. Gardner of the Institute of Industrial Research, Washington, D. C. For red lead paint they are as follows:

HAND MIXED RED LEAD PAINT

This paint shall be mixed not more than 48 hours before application. The pigment shall be pure oxides of lead containing not less than 85 percent Pb_3O_4, the balance to be PbO. The paint shall weigh not less than 25 pounds to the gallon. The vehicle shall consist of pure raw linseed oil, liquid drier and volatile thinner (turpentine or mineral spirits, or a mixture thereof). It shall be free from resin. When applied to a smooth vertical iron surface, the paint must dry free from tack in twelve hours without running, streaking or sagging. Such a paint may be made on the following formula:

Red lead	20 pounds
Raw linseed oil	5 pints
Petroleum spirits	2 gills
Liquid drier	2 gills

The formula is the United States Navy formula for red lead priming paint although they require that the pigment shall contain not less than 94 percent of true red lead, Pb_3O_4. When the paint is made up with red lead paste the Navy Department requires that it shall contain not less than 97 percent of Pb_3O_4, so that it will not harden in the container. The paint weighs 25 pounds 4 ounces per gallon. It will be noted that the proportions are 32 pounds of red lead to 1 gallon of oil.

Thirty-three pounds or more of red lead to 1 gallon of oil can be used with profit. With about one-third of the oil boiled no drier is necessary, and the formula can consist of red lead and linseed oil alone. The more red lead to a gallon, the harder will be the paint, and the better for underwater service.

Dr. A. H. Sabin, an authority on red lead paints, in his book "Red-Lead and How to Use It," recommends the following for the painting of the *outside* of the hull: As soon as the shell plates are in place, a coat of red lead paint made with boiled linseed oil containing 40 pounds of pigment to the gallon of oil. A similar second coat below the water, with a second coat above the waterline having 36 to 37 pounds of pigment to the gallon of oil. Then a third coat having 33 pounds of pigment to a gallon of boiled oil below the waterline, and the same amount of pigment with the oil half raw and half boiled, above the waterline. He recommends as long a time as possible between coats, even up to a year if the vessel is to be three years on the ways after being plated.

The paste red lead before referred to can be mixed up with linseed oil to produce any desired weight of paint. The proportions for the equivalent of 33 pounds of dry red lead to the gallon of oil are 24.29 pounds of the paste to 0.48 gallon oil and the resulting weight per gallon is 28 pounds.

The formula for the ready mixed liquid red lead paint before mentioned in its natural orange-red color is—

Red lead	79.69 percent by weight
Linseed oil	19.31 percent by weight
Liquid drier	1.00 percent by weight
	100.00 percent

The paint weighs 28 pounds per gallon, being heavier than the United States Navy standard paint, and one gallon contains about 22.3 pounds of red lead and 5.4 pounds of linseed oil. Taking the minimum specific gravity for linseed oil before mentioned at 0.932 we would have only 0.696 gallon of oil. This shows a proportion of about 32 pounds of red lead per gallon of oil, or the equal of the hard mixed paint before mentioned.

LEAD CHROMATE

The value of lead chromate as a pigment for priming paints on steel subjected to salt air is evidenced by tests made by the American Society for Testing Materials which will be more fully referred to later on. The paint of this nature made up by them stood at the top of the list. One of the paint manufacturers is marketing a paint of this type which is giving a good account of itself on ships, coal piers and other work about the water, and it has been passed upon by Dr. H. A. Gardner as promising excellent service on iron and steel structures. The formula for this paint is—

Pigment 45 percent	Lead chromate	25 percent
	Iron oxide (91 percent iron)	25 percent
	Silica	50 percent
Vehicle 55 percent	Linseed oil (heat treated)	64 percent
	Varnish, long oil, hard gum	20 percent
	Drier (oil)	10 percent
	Thinner (turpentine)	6 percent

BLUE LEAD

At least one manufacturer of priming paints is marketing a product called sublimed blue lead in oil. The pigment, which is produced by subliming lead ore and collecting the fumes, is a slate gray powder and it is about half lead sulphate. It is said to remain perfectly suspended in the vehicle and at the same time to be free from hardening in the container.

This paint is another of those in the before mentioned tests of the American Society for Testing Materials and was awarded a rating second to that of the lead chromate paint. The composition of the pigment as used in the tests was approximately:

Lead sulphate	50 percent
Lead oxide	35 percent
Lead sulphide	5 percent
Lead sulphite	5 percent
Zinc oxide	2 percent
Carbon	3 percent

The writer does not know of any instances of its actual shipboard service, but it looks promising.

(*To be continued*)

Applications of Arc Welding to Ship Construction

(*Continued from page* 424)

a paper read by Mr. Wall, before the British Institution of Mechanical Engineers in 1922: "This ship has been in commission for about 18 months. The welding employed in her construction has proved highly satisfactory. She has carried several cargoes of steel plating and similar material and has encountered heavy seas without showing signs of failure in any welded joint. At one time, in a collision, she received an indentation in her side without starting any welding. Lloyd's Register of Shipping recently examined this ship and reported that there were no signs of weakness, even at the break of the quarter deck, which usually happens with riveted vessels of this class."

(*To be continued*)

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Current Admiralty Decisions of Special Interest

By Calvert B. Gill*

Liability for Damage to Cargo

THE plaintiff in the case of the *Lake Fontanet,* American Maritime Cases Vol. 1, page 500, filed a libel to recover for damages to the cargo. The libel charges that the coffee was damaged by sweat and water by reason of it not being stowed with proper dunnage and by reason of the master and crew not taking proper precaution in the custody and care of the cargo. The defence offered was a provision of the bill of lading relating to sweating and that the dunnage was done in the manner usual and customary in the coffee trade, but the Court said although the damage resulted to the cargo from an excepted cause, yet if it could have been avoided by the exercise of proper skill and vigilance, the carrier was liable. That it is negligent to stow coffee with usual battens and matting for a voyage from a warmer to a colder climate, when sweating of the ship's hold could have been anticipated and other and safer methods of stowage could have been used.

Award for Services Little Above Towage

IN attempting to secure a large reward for salvage by towing a schooner a distance less than one hundred miles the Court in The Lewis Brothers, 287 Federal Reporter, 143, said that where the services for which salvage was claimed consisted of towing a schooner for ninety-five miles, which occupied about thirteen hours and delayed the steamer doing the towing only about ten hours, without requiring any substantial deviation from her course, so that the service amounted to but little more than ordinary towage, an award of $500 as salvage is sufficient and since only ordinary work was required of the crew of the towing vessel, the entire award should go to the owners of the vessel.

Conditional Sale Contract Does Not Authorize Liens

A CONDITIONAL contract for the sale of a vessel did not, by a provision that the buyer should discharge any liens against the vessel within 15 days, grant the buyer power to impose liens on the vessel where that was contrary to the intention of the parties, as manifested by a requirement that the buyer should carry a certified copy of the agreement and take such other appropriate steps as would give notice that he has no authority to suffer a lien to be imposed on the vessel, but was inserted in recognition of the fact that under certain circumstances those dealing with the ship would have a lien, despite the terms of the contract. The Henry S. Grove, 287 Federal Reporter, 247.

Jurisdiction of Action for Injuries on Dock

THE plaintiff, who was employed as a mess boy to serve meals to the seamen and do any work required in the steward's department of the ship, was ordered by the first mate, over the plaintiff's objection, upon the wharf to assist in the unloading of the ship and while so employed was injured by the negligently dropping of a loaded cargo sling upon him, endeavored to recover damages from the owners of the ship under the Merchant Marine Act of 1920, section 33, but the Court in Hughes vs. Alaska Steamship Company, 287 Federal Reporter, 427, said that the court has no jurisdiction of a suit instituted under the Merchant Marine Act of 1920, section 33, providing that any seaman who shall suffer personal injury in the course of his employment may at his election maintain an action for damages at law; no intention being shown by section 33 to include in the new remedy any cases in so far as territorial jurisdiction is concerned, not covered by the Act of March 4, 1915, section 20.

Ship Liable for Negligent Care of Seaman

IN the case of Unica vs. United States, 287 Federal Reporter, 177, the libelant seeks to recover damages, not because of the injury sustained when he accidentally fell into the hold of the vessel, but because of the negligence of the master in not getting him into a hospital sooner, so he could receive proper surgical attention. The Court said that the ship owes the seaman the duty of maintenance and care when he is seriously injured and if there is no surgeon on the vessel, it is the duty of the master to have him taken to a hospital at a port which would have resulted in but slight deviation from the vessel's course or, if the seaman waived his right to be taken to that hospital, the master was negligent in failing to have him removed to a hospital at the ship's destination for six days after the arrival of the ship in that port. Where such negligence exists the ship's owner is liable in damages.

Charterer Liable for Demurrage

WHERE a charter party required the vessel to be delivered at designated port between specified days, charterer to deliver cargo alongside and to load and discharge in five weather working days, or failing to do so to pay demurrage, lay days to commence from the time the captain reports ready to receive cargo and loading was delayed because of limited port facilities requiring vessel to wait its turn, the charterer was liable for demurrage, as it knew or should have known of the conditions and custom of loading at such port and contracted with reference thereto. The Court further states, that under charter parties requiring the charterer to pay demurrage after the expiration of the loading time agreed on and fixing lay days as commencing from the time the captain reports himself ready to receive or discharge cargo, the commencement of the lay days is at the expiration of such period after the service of notice of arrival by the master as the ship would require in the exercise of due diligence to haul to her wharf or pier, if the same were then provided. The Lake Yelverton, 288 Federal Reporter, 92.

A NEW DRYDOCK, 160 feet long, 44 feet beam, to accommodate vessels up to 175 feet long and weighing 5,000 tons, was opened on June 25 by the Riley Drydock Company, foot of Mechanic Street, Buffalo, N. Y.

* Attorney at Law, Baltimore, Md.

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Questions and Answers Relating to Naval Architecture and Marine Engineering

Conducted by James L. Bates, Naval Architect, and W. B. Newton, Marine Engineer

This department is maintained for the purpose of answering all questions relating to ships and their machinery. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so.

Formula for Bow Wave Length and Contour

Q. (1,201).—Can you give me a formula for the determination of the bow wave length and contour for a moving boat or ship?

A. (1,201).—Admiral Taylor, in "Speed and Power of Ships," Volume I, pages 73 to 76, discusses Wave Resistance generally. On page 74 he states that, if V is the speed of the ship in knots, the length of the bow wave from crest to crest is $0.5573\ V^2$.

On pages 108 to 111 he discusses squat and change of trim. The following is quoted from pages 110 and 111:

"Squatting is often thought to be a cause of excessive resistance. As a matter of fact, it is simply a result of large bow wave resistance. At $\frac{V}{\sqrt{L}} = 1.1$ to 1.2 the first hollow of the bow wave is somewhere near amidships and the second crest somewhere forward of the stern holding it up, as it were. With increase of speed the crest moves aft clear of the stern and the hollow moves aft toward the stern. The stern, of course, drops into this bow wave hollow, causing the squatting or rapid change of trim noticed. As speed is increased the hollow in turn moves beyond the stern and the vessel advances on the back of its own bow wave, as it were. The higher the speed, the longer the bow wave, and the closer the vessel is to the crest.

"It is perfectly true that marked squatting generally means great resistance, because it is the result of an excessive bow wave with a first deep hollow. With no bow wave there would be no squatting, and with slender models having small bow waves squatting is much less marked than for short full models. In every case, however, it is a symptom rather than a cause of resistance."

With very short boats driven at very high speeds the second crest is far aft of the stern, so that the boat itself is on the back of its own bow wave, but very close to its crest.

It is probably impracticable to derive the wave contour of a given boat theoretically. Perhaps a reasonable approximation to it might be made by developing a trochoidal wave of the length given by the above formula and a reasonable proportion of height to length.

It is noticeable in tests that while for a given model the ratio, length to height of bow wave, seems fairly constant with varying speeds, this ratio varies widely from model to model depending upon the type of the forebody. Hence, the selection of the proper value for this ratio would depend upon observation of either models or boats of the type contemplated.

Clearances for Pins and Journals

Q. (1,202).—Could you give me some rule by which I could determine the amount of clearance to allow on bearings and pins on different types and sizes of marine engines? I noticed a rule given by Dyson in his handbook, but this does not seem to hold good; also, could you recommend a book on this subject that would be suitable for merchant ship engineers? J. W. A.

A. (1,202).—The best information on this subject with which the writer is acquainted is tabulated below and is taken from the section on "Reciprocating Engines" prepared for Sterling's Marine Engineers' Hand Book by Wayne T. Dimm, B.S., assistant chief engineer, Newport News Shipbuilding and Dry Dock Company.

Satisfactory Clearances for Pins and Journals

Clearances in Inches for Pins		Diameter in Inches	Clearances in Inches for Journals	
Max.	Min.		Max.	Min.
0.005	0.002	5	0.005	0.0025
0.008	0.004	10	0.010	0.005
0.012	0.006	15	0.015	0.0075
0.015	0.008	20	0.020	0.010
0.018	0.010	25	0.025	0.0125

Bearing Clearances in Inches for Large Engines in Good Alinement

Crosshead pin brasses	0.006 to 0.007
Crank pin brasses	0.008 to 0.009
Main bearings	0.009 to 0.010
Eccentric straps	0.010 to 0.015
Crosshead slippers	0.010 to 0.012
Thrust shoes	0.005 to 0.007

Permissible Clearances on Lignum-Vitæ Bearings

Diameter of Journal in Inches	Minimum Clearance in Inches for New Bearings	Wear in Inches at Which Bearings Should Be Removed
8	0.050	1/4
10	0.060	1/4
12	0.075	5/16
16	0.100	3/8
20	0.125	3/8

Lignum vitæ must be well water soaked before being bored out.

Efficiency of Surface Propellers

Q. (1,203).—How does propulsion by surface propellers, as exemplified by the Hickman drive, compare in efficiency with that of the ordinary submerged propeller?

A. (1,203).—This is a large subject and one which has not yet been thoroughly investigated. The surface propeller and the vane propeller, now being developed in England, are both propellers which are designed to operate at partial submergence. The hub of the surface propeller is just above the surface of the water when the vessel is under way. Only the blade tips of the vane propeller act on the water. It results that the resistance of the shafting and struts or bossing is eliminated when either the surface or the vane propeller is used. This resistance amounts to from 5 to 10 percent of the bare hull resistance of twin screw vessels of moderate speed length ratio. In faster vessels it may be still greater.

Certain experimental basin tests indicate that a propeller, when not behind a hull, is more efficient when working as a submerged than when working as a surface propeller. This superiority is of the order of 6 to 8 percent.

The experience gained with a small vessel equipped with vane propellers shows a gain in propulsive efficiency of from 20 to 30 percent as compared with the same vessel fitted with submerged propellers.

Both the vane and surface propellers involve large diameters and low revolutions as compared with the submerged propeller designed for the same power. The result is slow turning machinery or the introduction of gearing. In either case, increases of weight and space are involved.

Accordingly, it would appear that both surface and vane

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propellers merit the careful consideration of the designer. The exact value relative to that of the submerged propeller and the services or types of vessel to which they are particularly adapted are yet to be accurately determined.

Use Area of Largest Section in Calculating Prismatic Coefficient

Q. (1,204).—In calculating the value of the prismatic coefficient for a vessel whose largest sectional area is not at her half length should the area of the largest section or that of the section at the half length be used?

A. (1,204).—The area of the largest section is always to be used regardless of its fore and aft location. For purposes of design the value of the prismatic coefficient lies in the conception which it conveys to the designer of the longitudinal distribution of the vessel's displacement. The most important features of this distribution are the fore and aft location and value of the area of the greatest section. Upon these two features largely depend the shapes of the curves of sectional areas both of the fore and after body. This knowledge is of great importance in powering ships. The area of the section at mid length has little bearing upon resistance or power except (as is generally the case) when it is the section of greatest area.

PERSONAL MENTION

FRANK I. THOMPSON, commissioner of the United States Shipping Board, has been reappointed as a Shipping Board commissioner for a six-year term.

J. J. DWYER, special assistant to the passenger traffic manager of the United States Lines, has been appointed manager of the third class department of the company.

MORRIS MALKIN has resigned as head of the chartering department of the United States Shipping Board to rejoin the staff of Daniel Bacon, agent of Elder Dempster and Company, Ltd.

BERT E. HANEY, a lawyer of Oregon active in democratic politics, has been appointed a member of the United States Shipping Board, succeeding former Senator George E. Chamberlain. Mr. Haney is a member of the law firm of Joseph, Haney and Littlefield, which specializes in the practice of business and commercial law.

HARRY E. DEVOY has been appointed manager of the New York office of the J. H. W. Steele Steamship Lines succeeding B. M. Flippin who has retired after serving for the past four years as vice-president, traffic manager and head of the New York office of the company. Mr. Devoy was formerly Mr. Flippin's assistant.

WILLIAM LAMBIE, a Scotch naval architect and yacht designer, has established headquarters at Los Angeles harbor, Cal., where he is designing pleasure yachts and service power boats. During the World War Mr. Lambie was naval architect for the Southwestern Shipbuilding Company at Los Angeles and had charge of the construction of twenty-five steamers built at the plant for the Emergency Fleet Corporation and private interests.

CAPTAIN A. T. HUNTER, for the past three years operating manager of the General Steamship Corporation, San Francisco, has been appointed marine superintendent of the United States Lines with headquarters in New York. Prior to joining the General Steamship Corporation Captain Hunter was with the Pacific Mail Steamship Company. At the outbreak of the World War he joined the troopship *Northern Pacific* as commander and, under his direction, the vessel made a record in transporting troops across the Atlantic.

CAPTAIN H. H. BIRKHOLM, formerly northwest manager of the General Steamship Corporation, has been appointed operating manager of the corporation succeeding Captain A. T. Hunter.

DANCHERT SMITH, of Arnesen, Christensen and Smith, naval architects and consulting engineers, Christiania, Newcastle-on-Tyne and Cardiff, a firm which has a large clientele among Scandinavian shipowners, has recently been created a Doctor of Science with highest honors, at the Technical University of Danzig. This degree was awarded on Dr. Smith's important paper, "Ueber die Drehfestigkeit der Schiffe (Torsional Strength of Ships)," based on scientific researches which have, after exhaustive laboratorial tests of steel ship models built for the purpose, resulted in establishing a complete theory for calculations of vessels' strengths, relating to torsional stresses, which no doubt will be of great universal interest and assistance to shipbuilders and naval architects, and beneficial to shipowners.

Danchert Smith

REAR ADMIRAL LOUIS R. DE STEIGUER became commandant of the Boston Navy Yard on June 14, succeeding Rear Admiral Henry A. Wiley, assigned to command a division of the battle fleet of the navy with the rank of vice admiral.

CAPTAIN HERBERT HARTLEY, commander of the *Leviathan*, was born in Oswego Falls, N. Y., 1875, and began his seafaring career as a cadet on the frigate *Saratoga*, loaned by the United States Navy to the State of Pennsylvania as a training ship. During his two years' service aboard the *Saratoga*, Cadet Hartley was instructed in seamanship by two young officers then rating as ensigns, but who since have won international fame as naval officers. These two men were Admiral William S. Sims and Captain William H. Fletcher. In 1895 Commander Hartley entered the service of the American Line as a cadet and continued steadfastly with that line until his recent appointment as commander of the *Leviathan*. The greater part of Captain Hartley's career was spent on board the S. S. *St. Louis*. During the World War this vessel, renamed the *Louisville*, was active in transport service and was the first armed American merchant ship to cross the German submarine zone. During the war Captain Hartley earned for himself many honors, including the Navy Cross for his exceptional devotion to duty and bravery. After the war Captain Hartley commanded various vessels flying the American flag until he received the appointment as commander of the *Leviathan*.

Captain Herbert Hartley

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The Month's Shipping and Shipbuilding News in Brief

Shipyard, Steamship and Port Activities and Other Notes of Interest in All Branches of the Marine Industries

Specifications Out for Clyde Ships

BIDS on approximately $4,000,000 worth of work, involving the construction of two new passenger and freight ships for the Clyde Line are expected to be opened early in July, according to latest reports. Plans and specifications for the construction of two large vessels and providing for an alternate proposition covering two smaller vessels have been issued by Theodore E. Ferris, naval architect, and a decision on this contract is looked for next month.

It is understood that the larger type vessel will have a length of about 410 feet between perpendiculars, 55 feet beam, 32 feet 9 inches depth to hurricane deck with a load draft of about 18 feet. The ships will be driven by turbine engines, steam being supplied by 4 Scotch boilers burning oil for fuel. They will probably be required to develop a speed of 15 knots.

Navy to Seek 15 New Vessels From Incoming Congress

IT has been learned that at the coming session of Congress the Navy Department will present a building program of eight cruisers, four river gunboats and three cruiser submarines, to the Budget Bureau and Congress.

The General Board has been instructed to consider plans which will give the navy the most efficient vessel of the cruiser type within the limitation of the Four Power Naval Treaty, since that treaty limits cruiser tonnage to 10,000, according to Secretary Denby. The eight new ships will probably follow closely the design of the Detroit class, now in progress of delivery.

The four gunboats will be for the Chinese river patrol as a recent inspection of the old vessels now engaged in that patrol indicated that they must be replaced as quickly as possible. In this connection, Secretary Denby said: "In view of the situation in China and the vast amount of trade at stake, the department feels it is most imperative that small modern gunboats be immediately authorized by Congress."

Tug and Lighter Planned

THE Southern Pacific Company, Pier 49, North River, is planning the construction of a steel harbor tug and a wood or steel harbor steam lighter. The tug will have a length of about 95 feet and it will be equipped with a compound condensing oil burning engine, while the lighter will be about 112 feet in length and also equipped with an oil burning engine. Plans and specifications are expected to be issued to bidders in about a week or ten days.

American Marine Congress Called for November 5-10 to Be Greatest United Move for Merchant Marine

THE Board of Directors of the American Marine Association has authorized the calling and holding of an American Marine Congress, during Marine Week, November 5-10, 1923, in New York City. It will be called by the American Marine Association in collaboration with the United States Department of Commerce, and other government departments and a great number of marine and allied organizations, including manufacturers, commercial, export, trade, transportation, farm, and labor groups.

POLICIES

The policy of this Congress will be one of self-defense for American shipping, and will function along the following lines:

(1) To urge, sponsor and recommend the modification or repeal of statutory restrictions or laws which tend to burden the world-wide competing capacity of American ships, but at the same time to maintaining or establishing all necessary restrictions as pertain to the safety of passengers and crews, protection of goods, and protection of rights, quarters and living standards of American crews.

(2) To recommend the adoption of such new legislation as will increase the world wide competitive capacity of American ships.

(3) To recommend and urge such necessary modifications and changes in the steamship code as may be advantageous.

(4) To develop and recommend such aid as will permit of an advantage in favor of building and repairing in American shipyards, with American labor, and materials.

(5) To recommend such standardization of construction and operation as will tend to reduce operating costs and increase competitive capacity.

(6) To recommend and urge the repeal of such legislation as permits of government agencies (such as navy yards) competing with private enterprises (such as private ship yards).

(7) To consider and make recommendations concerning government owned ships or lines competing with private ownership.

(8) To consider the advantages of reciprocal agreements with foreign lines on both outgoing and incoming shipments.

The Honorable Herbert Hoover, Secretary of Commerce, expressed the belief that this was the best effort he had yet heard of in the marine field, and that he would assist and co-operate to the utmost, and that the entire services of his department were at the association's disposal.

ORGANIZATION

The organization of the American Marine Congress will be as follows:

Administrative Committee

The working organization, in which is vested the authority to negotiate, arrange, direct and execute all plans, or in other words the machinery of the Congress:

Walter M. McFarland, Chairman; Frank J. Shipman, Vice Chairman; K. Warren Heinrich, Secretary; Charles F. Scott, James Plummer, Edward A. Colson, Frank W. Sterling, Fred B. Webster. All representing American Marine Association.

All communications should be addressed to the Secretary, who will route them to the proper party for action.

Central Committee

This committee will determine policies, subject discussions, sectional meetings, speakers, papers, etc., and is to work in close cooperation with the Administrative Committee. The President of the American Marine Association to always be Chairman of this Committee.

The personnel of this Committee is not yet complete, but present plans contemplate

Western Farmers and Manufacturers Conferred June 28-29

INVITATIONS were accepted by the American Steamship Owners Association, the Shipping Board, the Council of American Shipbuilders, the United States Ship Operators Association, the National Merchant Marine Association, and the Foreign Trade Council to attend a meeting of the Middle West Farmers-Manufacturers Conference held in Gibson Hotel, Cincinnati, June 28 and 29. This gathering, which is a very encouraging sign because of an awakening interest in marine affairs by farmers and others in the interior, had for its purpose the discussion of a means for stimulating foreign trade by the use of American flag ships.

The conference believes in the establishment of a powerful national merchant marine without subsidy, and representatives of the various shipping groups, as well as Senators from twenty middle Western states and twelve Atlantic and Gulf coast states had been asked to be prepared with suggestions for a plan looking to this end which can be formulated into a bill for presentation to Congress.

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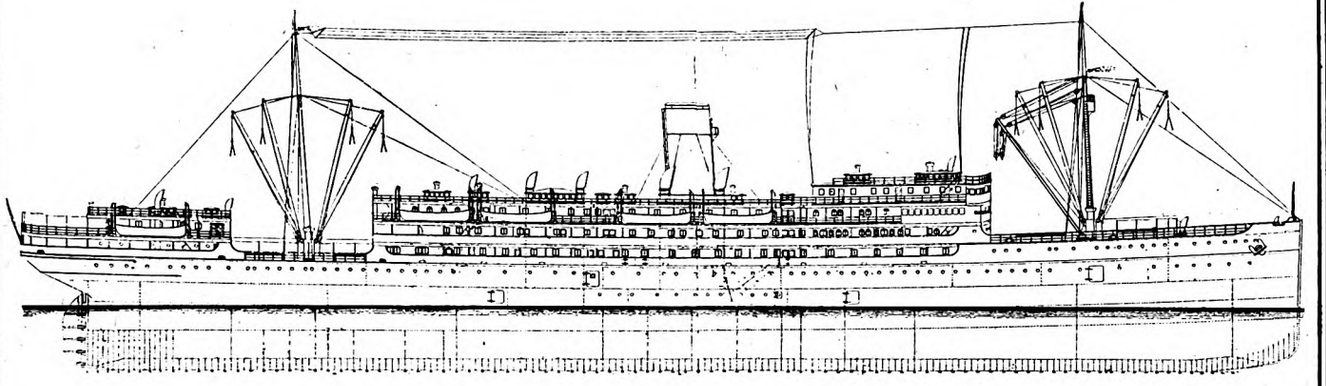

Outboard Profile of Passenger Steamers Proposed for California-Australia Service

Contract for $5,000,000 in New Ships for Oceanic Steamship Company Awaits Favorable Action By Shipping Board

THE placing of contracts for approximately $5,000,000 worth of new business, involving the construction of two passenger ships and their attendant equipment, may hinge on the action of Edward P. Farley, recently appointed as head of the Shipping Board to take office on June 12, according to information received by MARINE ENGINEERING AND SHIPPING AGE from Washington. The proposed ships have been designed for the Oceanic Steamship Company, of San Francisco, Cal., for the California-Australian service.

The company desires a ten-year mail contract with the government and immediately on accession to its requests is ready to issue plans and specifications to American shipyards for the new steamers. Frederick S. Samuels, general manager of the Oceanic Company and assistant to its president, was in Washington recently and laid the proposition before the Postal and Shipping Board authorities. According to reliable information, Mr. Samuels set forth the facts that the ships would be 500 feet in length, driven by turbo-electric machinery and modernly fitted throughout. They would be built entirely of steel.

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that the President, or an officer of each of the following organizations will comprise the Committee: American Marine Association, American Steamship Owners Association, Secretary of Commerce, U. S. Ship Operators Association, Maritime Association of the Port of New York, New York Tow Boat Exchange, Atlantic Coast Shipbuilders Association, Council of American Shipbuilders, Society of Naval Architects & Marine Engineers, American Bureau of Shipping, National Marine Engineers Beneficial Association, Masters, Mates & Pilots, U. S. Chamber of Commerce, National Foreign Trade Council, South Atlantic States Association, American Manufacturers Export Association, National Association of Manufacturers and (Proper Farmers Organization).

GENERAL COMMITTEE

This committee will be honorary, but from which various committees will be drawn. It will have no special duties and is to be composed of officers and Executive Committee members of American Marine Association, government officials of all departments, officers of all associations co-operating, and all other prominent individuals whose activities warrant their appointment on this committee.

Sectional Committees, whose function it will be to assist the Administrative and Central Committees in anything they possibly can in their own districts will be formed at once for the following:

(1) New England District.
(2) Port of Greater New York, Hudson and inland waterways.
(3) Delaware River District.
(4) Hampton Roads—Baltimore to Norfolk.
(5) South Atlantic States and Gulf.
(6) Mid-West States and Mississippi River District.
(7) Great Lakes District.
(8) Pacific Coast.

BENEFIT TO INDUSTRY

Throughout the entire industry, from the companies who manufacture those things which go into ships to the groups who furnish the cargoes, there is a great need for *UNITY OF PURPOSE*, and a wonderful opportunity for *CO-ORDINATION OF EFFORT*, to the end that a definite shipping program may be produced.

It is reasonable and logical to assume that if such a program can be carried out successfully, a marked improvement in the industry will result. The benefit derived from this Congress, either to the industry as a whole or to individual companies in it, is proportional to what they put into it.

Assistant Secretary of the Navy Roosevelt has approved participation of the Navy in the forthcoming Congress and is taking steps to have National Navy Day for all parts of the country fall during the week of the Congress.

Admiral Benson has also given the movement his hearty endorsement and co-operation, which latter is expected to be of special import to manufacturers and operators of Diesel engines, and Admiral Moffat, Chief of the Naval Air Service, will also take an active part, with an especial bearing on the delivery of mail to ships at sea.

Propeller Club of the Port of New York in Session, Whitehall Building, New York City, June 8, 1923.

At this meeting 150 members and guests listened to addresses by Colonel E. A. Simmons, President, American Marine Association; E. J. McCormack, of Moore & McCormack, and Matthew Hale, President of the South Atlantic Maritime Corporation.

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Forty-five Boats to Be Constructed for Canal Service

THE construction of five steel power barges and forty steel tow barges from plans and specifications prepared by Kindlund & Drake, naval architects and marine engineers, of 17 Battery Place, New York, is expected to be started in the near future. The boats are to be built for the Interstate Vessel Owners, Inc., of Buffalo, N. Y., for the carrying of bulk cargoes through the state barge canal between Buffalo and New York City. The contract will be one of the largest of its kind ever brought out and the vessels will embody many new features developed by the architects.

Each of the boats will be approximately 100 feet by 21 feet 6 inches by 13 feet; the towing barges to be equipped with internal combustion engines, each developing 375 brake horsepower.

10-Carfloat Order Awarded New York Shipbuilding Corp.

AN order, said to be one of the largest of its kind given since the war, has been placed with the New York Shipbuilding Corporation, of Camden, N. J., by the Pennsylvania Railroad, for ten steel car floats, to cost approximately $700,000.

This contract will place at the service of the rail line a fleet of modern barges each 350 feet long by 34 feet wide and nine feet in depth, for use in New York harbor. They are to have double tracks for freight cars, the center protected by a steel shed structure to permit handling of freight in all kinds of weather. Ten months is the contract time for completion but the work will be started very shortly and will be rushed to completion.

Newport News Yard Low Bidder for Steel Standard Oil Barge

THE Newport News Shipbuilding Company submitted the lowest bid for the construction of a steel self-propelled oil barge proposed for the Standard Oil Company of New Jersey, at the opening of tenders at 26 Broadway, on May 28. The vessel is to have a length of 220 feet, beam 38 feet, having a capacity of approximately 11,000 barrels of oil. Seven shipyards submitted quotations covering a variety of types of equipment.

Bids Received at Florence, Ala., for New River Towboat

THE United States Engineer Office, at Florence, Ala., received bids on June 11 for the construction of a steam driven stern wheel towboat, as follows: Charles Ward Engineering Works, $204,000 and Dravo Contracting Company, $208,000, with an alternative proposition, using stock engine, of $192,400. Award has not yet been made.

Bids Open July 16 at U. S. Engineer Office, Nashville, Tenn., for Construction of 136-Foot, Steel, Stern Wheel Towboat

THE United States Engineer Office, at Nashville, Tenn., will receive sealed proposals until 11 A. M., on July 16, for the construction of a 116-foot steel hull stern wheel towboat to be delivered at Paducah, Ky. The proposed vessel is to have a length overall of 136 feet 7½ inches, length molded 116 feet, breadth molded 29 feet, mean draft 3 feet 7 inches and is to be built to the American Bureau of Shipping rules. The longitudinal system of framing will be used and the boat will be steered by two rudders.

BOILERS

The main boiler is to be of the marine watertube cross-drum type, with a heating surface of approximately 2,000 square feet and designed for a gauge pressure of 235 pounds per square inch and 150 degrees of superheat. It is to be fitted for burning coal.

PROPELLING ENGINES

The propelling engines are to be of the surface condensing tandem compound type, with cranks on wheel shaft set at 90 degrees. They are to be designed for a working pressure of 250 pounds per square inch, 150 degrees of superheat at the boiler and a vacuum of 26 inches, the cylinders to be 10½ inches and 18 inches in diameter, respectively, with a common stroke of 72 inches. The condenser is to be cylindrical in shape, two pass, with a cooling surface of 800 square feet measured on the outside of the tubes.

The paddle wheel is to be of the radial fixed paddle type, 16 feet in diameter over buckets, with thirteen buckets 24 inches wide by 18 feet long.

Ellicott Machine Corporation Is Low Bidder for Dredge

THE Ellicott Machine Corporation, 1111 Bush Street, Baltimore, Md., with a price of $288,730, submitted the lowest tender for the construction of the steel hull 6-cubic yard grapple dredge *Wissahickon* when bids were opened by the Department of Wharves, Docks & Ferries of the City of Philadelphia, on May 31.

Vacancies for Draftsmen

The United States Civil Service Commission, Washington, D. C., announces the following competitive examinations:

Ship Draftsman. Receipt of applications will close July 24, examination to fill a vacancy in the Coast and Geodetic Survey, at entrance salary of $130 a month, plus increase of $20 a month, and vacancies in positions requiring similar qualifications.

Design Draftsman (Structural). Applications will be rated as received until August 31, to fill two vacancies at the Naval Operating Base, Pearl Harbor, Hawaii, one at an entrance salary of $6.80 a day, and the other at an entrance salary of $8.80 a day, and vacancies in similar positions.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. Civil Service Examiners at the Post Office or Customhouse in any city.

City of Norfolk Bids $4,000,000 for Government Supply Base, Including Two Piers, Warehouses and Equipment

NORFOLK, Va. (Special).—The City of Norfolk was the only bidder when bids on the Norfolk Army Supply Base were opened at the War Department on May 22. Four proposals were submitted by the city through City Manager Charles E. Ashburner and Port Director Arthur G. King.

The city submitted a bid of $4,000,000 for the entire property and offered $3,950,000 for the property exclusive of the "Barrett tract," on which stands the residence of the commanding officer of the base. A bid of $3,975,000 was entered for the property with the delayed delivery of certain portions, including a tract of six acres of land and one warehouse the government proposes to reserve for five years for the storage of certain war materials.

A bid of $5,000,000 was submitted for the whole property, including cranes, locomotives, repair parts, cars and fire apparatus owned by the government, stipulating that payments for the property should be carried over a period of thirty years with interest at 4 per cent, but the interest not to begin until January 1, 1926. This bid specified that the government keep the property in repair until that time.

The War Department has reserved decision on the sale of the property for twenty days.

For several weeks the general impression has prevailed that the city would have no opposition in bidding for the purchase of the Army Base. The specifications issued by the War Department require that the purchaser pay for the property in twenty-five years, and the city's proposals, with the exception of the $5,000,000, provided for payment within this time at 5 percent interest.

The property consists of approximately 639 acres of land. There are two covered concrete and steel piers, over 1,300 feet in length, eleven warehouses, 2,079,000 square feet of open storage, fifty miles of track on railroad yards and a score of miscellaneous buildings and other appurtenances.

The Army Base cost about $23,000,000 to build during the war, and the Government's estimate of replacement value is in the neighborhood of $16,000,000. The city's estimate, however, is somewhat below this figure.

The city is ready to finance the purchase of the property. The Port Commission does not feel that the city would be justified in paying a greater price for the property because there would be some doubt as to the ability to pay its own way for the present

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Webb Institute of Naval Architecture Holds Commencement

THE twenty-seventh annual graduating exercises of the class in naval architecture and marine engineering of the Webb Institute was held in the assembly hall of the college at University Heights, New York, on Thursday, June 7. Commander Stevenson Taylor delivered the opening address in which he compared the present time to that at the end of the Civil War. "There was apprehension then as there is now and in your particular work, although shipbuilding is at a low tide, there is bound to be a turn." The education received at Webb Institute, he pointed out, has been put to good advantage in other lines than shipbuilding by former graduates. It would probably be necessary, he said, for some of this year's class to enter other occupations at least temporarily.

It is the usual thing at commencement exercises, Mr. Lewis Nixon declared, to advise the graduates not to make the mistakes that we were advised not to make but did. It is very unusual on the other hand that a class of men entering the profession of shipbuilding is given such splendid encouragement as was furnished by Mr. Winthrop L. Marvin, vice president and general manager of the American Steamship Owners' Association.

Our Shipping Tradition

We should like to print his address in full but have felt it essential to devote a large part of our space this month to the *Leviathan* which places America again in the enviable position, after a great many years, of owning the largest, the safest and the fastest ocean liner in the world. These graduates enjoy the remarkable coincidence of the fact that they start their active work at the same time as this vessel begins her career as a passenger liner under the American flag.

Shipping has been nationally neglected for a long time and many there are who have come to believe that we can never make good on the sea. If the facts set forth by Mr. Marvin could be broadcasted over the land, this belief would be dispelled once and for all. Some of them are as follows:

"Shipbuilding was the very first form of ambitious and successful mechanical effort pursued by the pioneers of our race in the New World.

"For years shipbuilding was the most attractive trade which coast-born lads could learn.

"Though the British Cunard Company was the oldest on the Atlantic, it did not build its first iron hull until 1855, and it did not launch its first screw steamship until 1862.

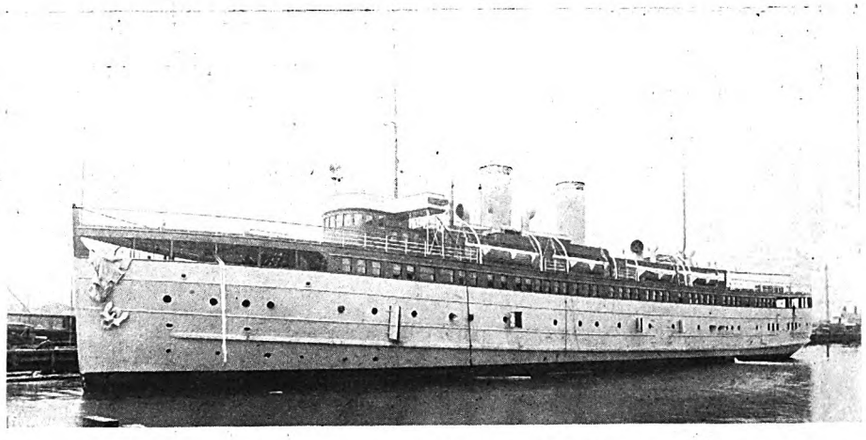
"Some of the stout iron screw steamers built in American yards 50 years ago are still afloat, so excellent were their materials and workmanship.

"The *Ohio, Indiana, Illinois* and *Pennsylvania,* built by Cramps' shipyard in 1872 and 1873 broke the record for speed then held by the *City of Brussels.*

Our Greatest Achievement

"This hasty review brings us down to the present time—to the stupendous achievement in emergency ship construction of 1,400 steel steamers—the most remarkable mechanical undertaking the world has ever seen—because in many instances the yards had to be created to build the ships.

"A nation whose naval architects, engineers and builders were unprogressive could never have performed this exploit."



S. S. United States, Reconditioned for Passenger Service on the Great Lakes

S. S. United States Refitted for Lakes Passenger Service

REFITTED as a passenger steamer for service on the Great Lakes, the *United States* recently left the Tebo plant of the Todd Shipyards Corporation with forty passengers. She is probably the first vessel to carry passengers from New York to ports on the Great Lakes.

Typical Stateroom

As the steam yacht *United States,* owned by Col. E. H. R. Green, son of the late Hetty Green, this vessel was the largest and one of the most palatial steam yachts in the world. She is 256 feet in length, 41 feet in beam and 16 feet in depth.

For the last few years she has been berthed at the Tebo Yacht Basin in Brooklyn. Several months ago she was purchased by the Peninsular and Northern Navigation Company. She has been refitted by the Todd Shipyards Corporation from designs prepared by Henry J. Gielow, naval architect, new staterooms, accommodating about 100 passengers, having been added. Considerable deck space has been provided and four dining rooms arranged in the forward part of the vessel.

Original Service

Originally built by the Manitowoc Shipbuilding Company, of Manitowoc, Wis., in 1909, to carry passengers between Milwaukee and Grand Haven, the *United States* was elaborately fitted with forty-six staterooms, each named after a state in the Union. The large public rooms were decorated with a series of historical paintings depicting stirring episodes in the nation's history.

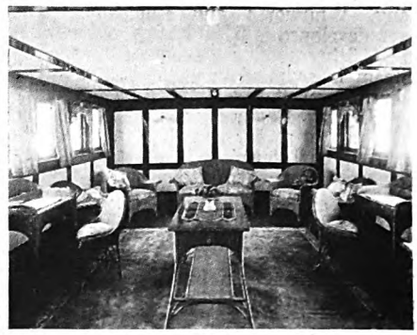
After six years the vessel was purchased from the Crosby Navigation Company by Col. E. H. R. Green for about $500,000. The contract for rebuilding the vessel according to the new owner's plans was awarded to the Robins plant of the Todd Shipyards Corporation.

Hull Lengthened

About forty feet were added to the hull amidships and the entire interior of the vessel rebuilt. Col. Green desired to retain all home comforts in the new designs and consequently many nautical features were done away with. All overhead beams were concealed and the new rooms laid out on a much larger scale and furnished with remarkable examples of very elaborate period furniture.

The living room on the main deck was very spacious, being 26 by 28 feet in size and containing an enormous open fireplace in the after end. The gymnasium was also located on this deck, with suites of Turkish, vapor and shower baths adjoining.

Dining Room



Lounge

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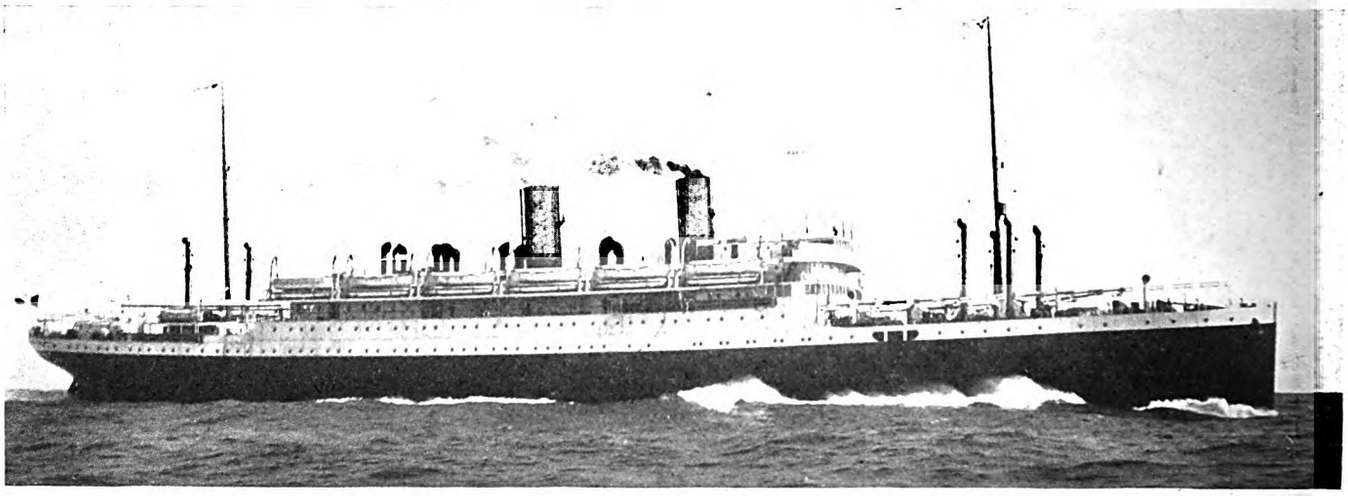
Foreign Shipping and Shipbuilding Activities



New French Line Passenger Steamship Cuba

New French Turbine Liner Cuba to Go on St. Nazaire-Havana-Vera-Cruz Route

PARIS, France (Special).—The Compagnie Generale Transatlantique (French Line) has taken delivery of the new passenger vessel *Cuba* built by Messrs. Swan, Hunter and Wigham Richardson at Newcastle-on-Tyne. This twin-screw liner is 476 feet long, 59 feet 9 inches beam, 39 feet 4 inches deep; her deadweight is 6,375 tons on 24 feet 7 inches draft. Her approximate gross tonnage is 8,850 tons.

The propelling machinery consists of two sets of Rateau steam turbines driving the propeller shafts through double reduction gearing. Owing to the inconveniences experienced in service with several vessels equipped with ordinary double reduction gearing in the course of the last year, the owners decided that in lieu of Parsons gearing, as was originally designed, Westinghouse gearing with floating frame should be fitted, and the *Cuba* is the first vessel equipped with this design of gearing in this country.

Quill shaft drives have thus been adopted between turbines and first reduction pinions as well as between first reduction wheels and second reduction pinions. The nickel steel pinions were manufactured by Messrs. Armstrong, Whitworth and Company. The power developed is 6,500 horsepower normal and 9,000 horsepower maximum.

Steam is supplied by eight boilers. The oil burning plant was supplied by the Wallsend Slipway Engineering Company. The boilers are capable of being rapidly converted to coal burning if necessary. Arrangements have been made for the ship to bunker at Havana where in spite of the rate of exchange the cost of oil fuel is considerably lower than the prices current in French ports.

The *Cuba* has been built to the highest class of the Bureau Veritas, the French ship classification society. She has been designed to comply with the regulations on safety at sea laid down at the 1914 International London Conference although these new regulations have not so far been definitely ratified by French Parliament and are not yet enforceable.

Passenger accommodations are provided for 8 de luxe, 273 first class, 50 second class, 76 third class passengers, 176 cabin emigrants and 504 emigrants in posts. The total of the passengers thus works out to 1087.

The decoration of the *Cuba* has received special attention from the owners and she will rank among the finest modern passenger vessels in this country. The decorative work has been carried out by three well-known French firms of ship decorators (Billard et Rousseau, Leglas Maurice et Jamin, and Marc Simon). The leading feature of the decoration of this vessel is an example of the French modern art, and this explains why reproductions of several pieces of furniture and decorative work of this steamer have been shown at several important art exhibitions in Paris.

The *Cuba* ran her speed trials on April 12: a maximum speed of 17 knots was attained and the service speed of the ship is expected to be about 15.75 knots.

The *Cuba* is to run on the Saint-Nazaire, Coruna, Havana, Vera-Cruz route, together with the two other liners *Espagne* and *Flandre*. She sailed on her maiden trip on May 5.

Turbine Blades of Monel Metal

LONDON, England (Special).—At the recent conference at Sheffield on the subject of corrosion, a number of the industrial uses of monel metal were discussed. In regard to turbine blading, it was suggested that any troubles experienced with monel metal were not due to any inherent inability of the metal to withstand the stresses to which it is subjected. If the preparation of the alloy and the heat treatment is right, it was asserted that users could rely that metal specially prepared for turbine blades would have a tensile strength of 40 tons per square inch and an elongation of 26 percent. Moreover they would have the additional advantage that at temperatures as high as 750 degrees Fahrenheit the metal would not suffer to any appreciable extent in tensile strength and modulus of elasticity.

A Five-Bladed Propeller

LONDON, England (Special).—It has been recently learned that a five-bladed screw propeller has been manufactured by Bull's Metal and Melloid Company, Yorker, England, to the order and specification of a Continental firm of engineers. It is not known for what purpose this propeller has been made but it is a solid wheel 18 feet 5 inches in diameter and it weighs 9 tons 15 hundredweight. The propeller has been made from the firm's special metal.

Single Reduction Geared Turbines for S. S. De Grasse

PARIS, France (Special).—I reported in my article which appeared in the May issue of MARINE ENGINEERING AND SHIPPING AGE that the French Line were considering the adoption of turbo-electric drive for their passenger vessel *De Grasse* which is under construction at the yards of Messrs. Cammell, Laird, at Birkenhead, and will be placed in service on the Havre-New York line.

This scheme has now been definitely rejected by the owners for several reasons: the chief reason lies in the fact that France has had so little experience with the electric drive, there being only two French vessels so equipped. Second: Very few French marine engineers are acquainted with this mode of ship propulsion and it would be necessary to provide special training for them. Third: The French Line considered it not advisable to make a first experiment of this mode of propulsion on a vessel placed into service on the mail line between Havre and New York.

It is thus likely that the adoption of turbo-electric drive will be reserved for vessels engaged in services which do not involve so much reliability in the running of vessels.

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Marine Construction News of the Month

Ship Contracts — New Ship Concerns and Shipyard Improvements—Terminal Projects—Government Contracts

SHIPS AND SHIPBUILDING

Steamer Drydocked, Chester, Pa.—The steamship Lio has been drydocked at the Sun Shipyard, Chester, for miscellaneous repairs.

Ferryboat Docked, Portsmouth, Va.—The ferryboat Porpoise has been docked at the Portsmouth Navy Yard for necessary repairs.

Overhauling, Toledo, Ohio.—The steamer H. S. Wilkinson, damaged in collision in the Great Lakes, has been taken to Toledo for extensive repairs.

Tug Overhauling, Portland, Ore.—The F. A. Douty has been drydocked to have a new wheel fitted and undergo annual inspection.

Steamer Repairs, Ashtabula, O.—The steamer Panay, with about six damaged plates, has been docked for repairs at the Ashtabula yard.

Steamer Repairs, Detroit, Mich.—The steamer Conneaut, which lost her shoe and rudder recently, has been drydocked at Detroit for repairs.

Tanker Drydocked, Chester, Pa.—The American tanker Sun, owned by the Sun Oil Company, has been drydocked at the Sun Shipbuilding Company, Chester.

Repairs, Portland, Ore.—The crippled schooner Fred Baxter was towed to Portland recently to be drydocked. She lost her propeller on her way up the coast.

Freighter Drydocked, Chester Pa.—The Furness-Prince freighter Portuguese Prince has been drydocked at the Sun Shipbuilding & Drydock Company for repairs.

Installation of Stern Frame, San Francisco, Calif.—The Norwegian motorship Handicap has been placed on the Bethlehem ways to have a new stern frame installed.

General Overhauling, Buffalo, N. Y.—The passenger steamship Tionesta is in the Buffalo Drydock to have her bottom painted and a general inspection and overhauling.

Overhauling at Navy Yard, Philadelphia, Pa.—The Pennsylvania State schoolship Annapolis will soon undergo annual overhauling at the Philadelphia Navy Yard.

Damage Repairs, Portland, Ore.—The steamer Rosalia Mahony has been lifted for repairs due to damage caused when she upset recently with too heavy a deck load.

Bids Requested, Philadelphia, Pa.—The Reading Coal and Iron Company is asking bids for the barge Ephata, now lying on the Maine coast, to be sold "as is and where is."

Steamer Drydocked, Superior, Wis.—The steamer Grand Island, which hit the crib at the entrance to West Neebish Cut, has been placed in drydock at West Superior for repairs.

Turbine Gear Repairs, Philadelphia, Pa.—The contract for repairing the turbine gears of the Italian steamship Tuscola has been awarded to the John Baizley Iron Works, Philadelphia.

General Overhauling, San Francisco, Cal.—The steamship Agnes Dollar was taken to the General Engineering yards for drydocking, general overhauling, and to have her tailshaft drawn.

Steamer Drydocked, Chester, Pa.—The British steamship Tartar Prince has been drydocked at the yards of the Sun Shipbuilding and Drydock Company, Chester, for painting and inspection.

Coast Guard Cutter Repairs, Oakland, Cal.—The Hanlon Shipbuilding Company submitted the lowest estimate for repairs on the United States coast guard cutter Cahokia, with a price of $1,178.

New Boilers, Portland, Ore.—The Commercial Iron Works received the contract for the removal of Scotch marine boilers aboard the government dredge Clatsop and will install new pipe boilers.

Fireboat Repairs, Jacksonville, Fla.—The city fireboat John B. Callahan has been hauled out on the Merrill-Stevens drydock for slight repairs, the Merrill-Stevens Company having submitted the lowest bid.

Steel Ship Launched, Chicago, Ill.—The new freighter Herbert N. Heath, of 120 tons, has been launched. She is of steel construction and steam power, is 65 feet long, 22 feet wide, and draws eight feet.

Tug Drydocked, Portland, Ore.—The tug George H. Mendell was recently placed on the Portland drydock to ship a new propeller and also to have her stern bearing inspected, cleaning and repainting of the hull.

Lighter Launched, Baltimore, Md.—Booz Brothers recently launched the second of an order for two harbor lighters for the Cottman Company, the dimensions being 80 feet long, 24-feet beam, and 7 feet 6 inches deep.

Repairs Completed, Canal Zone.—The tanker steamer Miskianza left the Canal Zone early last month after the completion of repairs amounting to about $13,000. The ship is being operated by Walker & Daly, New York.

Steamer Repairs, San Francisco, Cal.—At the opening of bids for the repairing of the steamer West Chopeka, operated by Struthers & Barry, the Crowley Shipbuilding Company, of San Francisco, Cal., was low bidder with a tender of $1,470.

Low Bidder, San Francisco, Cal.—With a price of $835 Smith & Scanlon was low bidder for voyage repairs on the Pacific Mail intercoastal carrier Ecuador. Other bids were: United Engineering, $945; Bethlehem, $1,025; Moore's, $1,098, and Crowley's, $1,250.

Contracts Awarded, Mobile, Ala.—The Alabama Drydock & Shipbuilding Company was awarded the following contracts: steamship Hulaco, for inspection, painting, drydocking and overhauling; and the bay steamer Crescent City, for cleaning and painting bottom.

Low Bidder, Oakland, Cal.—At the opening of tenders for voyage repairs to the Swayne and Hoyt government-operated freighter West Jappa, the Hanlon Shipyard submitted the lowest bid. The prices were: Hanlon's, $2,688; Moore's, $2,738, and Bethlehem, $2,775.

Overhauling and Repairs, Buffalo, N. Y.—The Oldman-Magee Boiler Works has transformed the steamer Usono, belonging to White-Gratwick & Mitchell from a trunk-hatch type into a five-hatch type, giving her at the same time a general overhauling and repairs.

Tug Overhauling, Staten Island, N. Y.—The tug Howard C. Moore, of John E. Moore Company, is undergoing a general overhauling at the Staten Island Shipbuilding Company's Port Richmond yard. Foster waste heat type superheaters for 75 degrees superheat will be installed.

Shipyard Activities, San Francisco, Cal.—The Bethlehem Shipbuilding Corporation received the following contracts: Matson steamer Maui and the American-Hawaiian steamer Ohioan, for cleaning, painting and drydocking; the Idaho, Water Nymph, Pennsylvanian and tug Payson, for miscellaneous repairs and painting.

Diesel Dredge Launched, Portland, Ore.—The Portland Shipbuilding Company recently launched the first Diesel electric dredge yet floated in waters of the United States, so far as records are known to the Long-Bell Lumber Company. The dredge is the Texas, a wooden-hull type.

Bids on Windlass, Staten Island, N. Y.—Sealed proposals were received by the Superintendent of Lighthouses, 3rd District, Staten Island, N. Y., on June 11, for one steam capstan windlass, to be delivered at tidewater at Key West, Fla., accessible to the tackle of a lighthouse tender.

Estimate on Engines, Portsmouth, Va.—The Bureau of Engineering has designed a new type of gasoline engine, a detailed description of which has been furnished the navy yard with the request that the yard submit detailed estimates as to time and cost for manufacture of fifty of them.

New Ferryboat Planned, San Francisco, Cal.—The officials of the Northwestern Pacific are reported as planning to build a ferryboat, to be 280 feet long and 72 feet beam, and of the latest type. Several shipyards are now engaged in drawing plans for submission to the Northwestern Pacific Company.

Miscellaneous Repairs, Buffalo, N. Y.—The Ashtabula & Buffalo Dock Company has finished installing a new tank top in the steamer Venus and has placed new furnaces and made other repairs on the steamers Tarus, Hemlock and Conopus, all belonging to the Interlakes Steamship Corporation.

Steamers Drydocked, Great Lakes.—After having grounded near Bailey harbor, the steamer Alex B. Uhring was placed in drydock at Milwaukee with twenty-nine damaged plates, five of which will be renewed. Steamer Back Bay, formerly the Burlington, has been docked at Cleveland for repairs to bottom damage.

Miscellaneous Repairs, Chester, Pa.—The Atlantic Refining Company's tanker J. E. O'Neil has been drydocked at the Sun Shipbuilding and Dry Dock Company for miscellaneous repairs. The Merchants' and Miners' Transportation Company's passenger steamship Ontario has also been drydocked at the same company's yards.

Steamship Conversion, Brooklyn, N. Y.—The Montpelier, one of the steamers operated by the United American Lines, has been taken to the Crane Drydocks, Brooklyn, for reconditioning as an oil-burning ship, after which she will be placed in the recently established service between Pacific coast ports and Europe.

Contract Awarded, San Francisco, Cal.—The General Engineering and Dry Dock Company received the contract for voyage repairs to the Pacific Mail liner President Wilson, at a price of $4,018. The other bids received were: United Engineering, $5,177; Crowley's, $5,342; Moore's, $5,400, and the Bethlehem Shipbuilding Corporation, $5,596.

Scout Cruiser Passes Trial, Puget Sound.—The second cruiser to leave the Tacoma plant of the Todd Shipyards Corporation, the United States scout cruiser Milwaukee, recently passed a successful trial trip, making a speed of 35 knots or 40.3 statute miles per hour. During the trial the Milwaukee's engines developed 97,000 shaft horsepower.

Contracts Awarded, Mobile, Ala.—The Alabama Dry Dock & Shipbuilding Company has been awarded the following contracts: Steamship Edgefield, chipping, scaling, painting, tail shaft examination and other miscellaneous repairs; tug Buzzard, drydocking and installing new propeller; tug Nimrod, boiler repairs, and United Fruit Company's steamship Venator, repairs.

Shipyard Activities, Oakland, Cal.—The Moore Drydock Company has been awarded the following work: Installing of a new tailshaft on the steamer Dewey and various repairs on the transport Dix, ferryboat Cazadero, motorship La Merced, the latter being equipped with new masts and other general reconditioning preparatory to departing in the offshore trade, and the schooner Fox.

Repair Contract, Kearny, N. J.—A contract for the drydocking and general repairs and the putting into condition of approximately thirty vessels of the Submarine Boat Corporation, operated by the Transmarine Corporation, in connection with the Port Newark development, has been awarded to the Federal Shipbuilding Company, of Kearny, N. J. It is

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understood that the contract will involve over $50,000 and the vessels are to be taken to the yard at the rate of one per week.

New Steamer, South Jacksonville, Fla.—George W. Gibbs, Jr., president of the Gibbs Gas Engine Company, has announced that the company has obtained the contract for the construction of a new steamer for the Virginia-Carolina Chemical Company, of Wilmington, N. C. The steamer will be 65 feet long, have two decks, and will be equipped for passenger and freight service. It will be used at Richmond, Va.

Shipyard Activities, Oakland, Cal.—The Coast Guard cutter Golden Gate is being repaired by the Hanlon Shipbuilding and Drydock Company, at a price of $281. The yard was also low bidder on repairs to the West Prospect, operated for the Shipping Board by Struthers & Barry, the bid submitted being $739. The lumber carrier Helen P. Drew and the pilot boat Gracie S. are at the Hanlon yard for general overhauling.

Ship Repair Contract, San Francisco, Cal.—The General Engineering and Dry Dock Company, San Francisco, Cal., received the contract for miscellaneous repairs on the Pacific Mail liner President Lincoln. The following tenders were received: General Engineering & Dry Dock Co., $3,316; Moore Dry Dock Co., $3,554; Bethlehem Shipbuilding Corp., $3,810; Hanlon Dry Dock & Shipbuilding Co., $3,857; United Engineering Co., $3,945.

Extensive Repairs, Manitowoc, Wis.—The steamer Ann Arbor No. 4, which went to the bottom at the entrance to Frankfort harbor last February has been placed in drydock at Manitowoc. She has eighty-nine shelf plates and twenty-six deck plates damaged, her bottom being shoved up 10 inches from bilge to bilge for fifty feet. The steamer is to be at the shipyard for about five weeks and repairs will cost approximately $100,000.

Repair Contracts, San Francisco, Cal.—The Bethlehem Shipbuilding Corporation was awarded the following repair work: Standard Oil tanker K. R. Kingsbury, overhauling; the Chilore, final adjustment preparatory to speed test; the La Purisima, general overhauling; tanker Levant Arrow, to have a new furnace installed in her boilers; the Mystic and freighter American, both of the American-Hawaiian fleet, for general repairs and cleaning.

Contracts Awarded, San Francisco, Cal.—The Bethlehem Shipbuilding Corporation tendered the lowest bid for drydocking, cleaning, painting and general repairs to the army transport Meiggs, the following bids having been received: Bethlehem, $3,925, and Moore Drydock Company, $4,140. The Bethlehem Company was also low bidder for the general overhauling of the Associated Oil tanker W. S. Porter, with a bid of $2,395, the Moore Company submitting a tender of $2,424.

Ship Repairs, Kearny, N. J.—At the opening of tenders for the work of general repairs on the Montebello, the Bethlehem Shipbuilding Corporation was low bidder. The bids were: Bethlehem, $11,803; Hanlon's, $13,649; General Engineering, $13,923; Moore's, $14,651, and the Main Iron Works, $15,699. On the Shipping Board steamer Bearport the bids were: Bethlehem, $11,803; Hanlon's, $13,649; General Engineering, $13,923; Moore's, $14,951, and the Main Iron Works, $15,699.

Shipyard Activities, San Francisco, Cal.—The Crowley Shipyard was low bidder for carrying out miscellaneous repairs and cleaning of the Swayne & Hoyt Government operated steamer President Harrison and the quarantine tug Albatross. The bids submitted on the President Harrison were: Crowley's, $175; General Engineering, $211, and Bethlehem, $250. The tenders on the Albatross were: Crowley's, $635; General Engineering & Drydock Company, $688, and William Cryer, $702.

Construction Contract, Portland, Ore.—The contract for the construction of the hull for a new Snake river sternwheel steamer for the O. W. R. & N., of Portland, Ore., has been awarded to Supple & Martin. The new vessel, which is to replace the steamers Lewiston and Spokane, destroyed by fire last year, is to represent an outlay of about $65,000 and will be 160.2 feet long, with a beam of 35 feet and depth of hold of six feet. Machinery saved from the burned steamers will go into the new vessel.

Radio Contract, San Francisco, Cal.—District Manager Linton of the United States Shipping Board in Seattle has advised A. Y. Tuel, manager of the San Francisco offices of the Federal Telegraph Company, that permission to install a Kolster radio compass and position finder on the Admiral-Oriental liner President McKinley had been received and it is stated that if the installation proves successful after a round trip to the Orient all of the 535-type vessels out of Seattle will be similarly equipped.

Shipyard Work, Mobile, Ala.—The Alabama Dry Dock & Shipbuilding Company, Mobile, has been working on the following contracts: Steamship Betterton, extensive turbine and condenser repairs, etc.; steamship Bayou Chico, stern tube rebushed, rivets renewed and other minor repairs; steamship Taubate, minor work about boilers and deck winches; U. S. D. B. Boat L-58, renewal of bad planking, caulking all seams and renewal of entire copper sheathing on bottom and rolling chocks and rudder; and the steamship Quabbin, necessary repairs.

Vehicular Ferry, New York.—The Pennsylvania Railroad has placed in commission a ferryboat reconditioned to handle exclusively the vehicular traffic between New York City and Jersey City. The railroad has gradually converted its entire ferryboat fleet of eight boats into what is termed "double team gangway boats," on which the lower deck is reserved for vehicles and the upper deck for passengers. This reconditioning has doubled the vehicular carrying capacity so that sixty passenger automobiles can be accommodated on each trip across the river.

Yacht Refitted, Brooklyn, N. Y.—The steam yacht United States, owned by Col. E. H. R. Green, has been refitted as a passenger ship to carry passengers from New York to ports on the Great Lakes. The vessel is 256 feet long, 41 feet beam and 16 feet depth, and was one of the largest and most palatial steam yachts in the world. About forty feet have been added to the hull amidships and the entire interior of the vessel has been rebuilt. Several months ago she was purchased by the Peninsular & Northern Navigation Company. She has been refitted from designs prepared by Henry J. Gielow, naval architect, by the Todd Shipyards Corporation, new staterooms accommodating about 100 passengers, having been added.

Conversion Jobs Pending.—It has been learned that the O'Boyle Lighterage Company is figuring on taking the McIntosh & Seymour Diesel engine out of their wooden oil tanker J. F. Penrose, purchasing a Lake-type steel cargo boat from the Shipping Board and installing the engine therein. The Lake-type boats are of 3,500 deadweight tons capacity. The carrying out of this contract depends upon a satisfactory settlement with the Shipping Board with regard to price. Other reports in marine circles indicate that a large shipping company, whose stock is owned mainly by foreign interests, has definitely decided to convert several Shipping Board vessels to motorships, but so far has not been able to reach satisfactory agreement with the Shipping Board.

Extensive Repairs, Mobile, Ala.—The steamship Sapulpa, to be renamed the Cape Ann, has been placed on the docks of the Alabama Dry Dock & Shipbuilding Company. She was recently purchased by the Pure Oil Company. The work to be done on the vessel includes the following: Cleaning, painting bottom from keel to deep load line, examination of tail shaft, top sides scraped and painted, etc.; the inside work including testing out and repairing entire electric, telephone and fire alarm system and renewal of all defective fixtures, boilers cleaned, main and auxiliary condensers tested out, tubes cleaned and proven tight, refrigerating system thoroughly cleaned, charged and tested, ice machine thoroughly overhauled, and various other miscellaneous repairs.

New Fireboat, Los Angeles, Cal.—The Los Angeles Harbor Commission and Chief Ralph J. Scott are laying plans for added fire-fighting equipment at Los Angeles Harbor, both land and water apparatus. A new fireboat and engine company are to be located on the Wilmington waterfront, the center of the port's industrial growth. Chief Scott has also announced that fireboat No. 1, now stationed on the main channel at the harbor, will be remodelled. The gas engine, at present propelling the craft, will be replaced by a 300-horsepower full Diesel engine of the latest type, at a cost of approximately $33,000. A tower will be constructed on the boat, so that the crew of the craft may be able to fight steamer and dock fires with maximum efficiency, the boat's two pressure heads being joined to a single line, operated from the top of the tower.

Floating Equipment, Wilmington, N. C.—The United States Engineer Office, Wilmington, N. C., received bids on June 4 for the construction of twenty-eight steel hulls to replace certain floating equipment now used by the Federal Government in local river and harbor improvements and maintenance work. One of the vessels to be built for the Engineer Department is a new hull for the snag boat H. G. Wright, now used for removing obstacles from local waterways, two will be barges for conveying water and materials for dredges and other craft engaged in Government work on the river, and twenty-five will be catamarans for the suction dredge Henry Bacon, at work on the lower Cape Fear. The catamarans are to be small floats for suporting a large steel pipe through which mud and material pumped from the river channel by the dredge Bacon is conveyed to shallow water near the river bank. These floats are to replace wornout catamarans of wood.

SHIPYARDS AND DRYDOCKS

Shipyard Purchased, Oakland, Cal.—David Blankenhorn, Los Angeles business man and member of the syndicate acquiring the industrial property, announced the purchase of the Liberty Shipbuilding Yards in Oakland, containing more than 170 acres. The title on the land was obtained from the Shipping Board by a group of Los Angeles and San Francisco financiers, including Mr. Blankenhorn, president of David Blankenhorn, Inc., investments; William F. Humphreys, attorney and president of the Old Mission Portland Cement Company in San Francisco; Henry Rosenfeld, executive of the Insurance Exchange and Firemen's Fund Insurance Company of the northern city, and James Tyson, president of a number of lumber concerns, including the Consolidated Lumber Company. During the war the yards were under the management of the Emergency Fleet Corporation, and many large sea-going vessels were constructed there. It is proposed to divide the yards into units and to sell them for industrial purposes to organizations who intend to locate in that section.

NEW INCORPORATIONS

The Nautilus Steamship Corporation of Manhattan has increased its capitalization from $700,000 to $800,000.

The Gaston, Williams & Wigmore Steamship Corporation, a Delaware corporation, has surrendered its authority at Albany.

The Lancaster Steamship Corporation of Manhattan, owning the steamer Lancaster, has increased its capitalization from $300,000 to $350,000.

Banks Rigging Company, of Brooklyn, ship riggers, capital $10,000, chartered at Albany. Incorporators: T. M. Reid and E. M. Banks.

The International Salvage Corporation, of Brooklyn, incorporated under Delaware laws, has increased its capitalization from $200,000 to $500,000.

The General Marine Salvage Corporation, capital $750,000, incorporated under Delaware laws. Corporation Trust Company, of America, registrars.

The New York, Atlantic City and Philadelphia Steamship Company, capital $2,000,000, incorporated in New York. The beginning of this line will give Philadelphia two services to New York.

The Mexican, American Fruit & Steamship Corporation, capital $12,000,000, organized under Delaware laws. Incorporators: F. J. Porter, Montgomery B. Angell and Otis T. Bradley, of New York.

PORT IMPROVEMENTS

Ferry Docks, Windsor, Ont.—Detroit & Windsor Ferry Company plans to extend and improve docks at Windsor, wood pile, concrete and timber. $200,000.

Harbor Improvement, Olympia, Wash.—Thurston County voted on June 26 on improving harbor, including channel 35 feet deep, at low water, with turning basin, also tidelat and fill.

Dredging Bids Rejected, New York, N. Y.—Commissioner of Docks, Pier "A," North River, rejected bids for dredging between West 97th and West 99th streets. Contract 1799. Will re-advertise.

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Levee, Stockton, Cal.—Western-Pacific Railroad, Mills Building, San Francisco, awarded the contract for a two-mile levee south of Stockton, 175,000 cubic yards, to W. A. Betchel, 625 Market street, San Francisco.

Sea Wall, Vicksburg, Miss.—Sealed proposals will be received until July 2, at City Hall, for a concrete wall along river front. Miller-Butterworth Company, 624 Southern Trust Building, Little Rock, Ark., engineers.

Rebuilding Dock, Superior, Wis.—Pepard & Fulton, 217 Board of Trade Building, was awarded the contract for rebuilding ore dock No. 2, here, by the Great Northern Railway, Railway Building, St. Paul, Minn.

Harbor Development, Los Angeles, Cal.—City voted $15,000,000 bonds for development of harbor, including docks, wharves, warehouses, elevators, bunkers, railroad terminals, channels, breakwaters, jetties, dikes, etc.

Grain Elevator, Sarnia, Ont.—A grain elevator, steel and concrete, is planned on waterfront, here, by Hunt Brothers, Ltd., care of C. R. Hunt, Nightingale avenue, London, at $1,500,000. Prices are wanted on material and equipment.

Pier, etc., Boston, Mass.—The City of Boston awarded the contract for rebuilding piers, bulkhead and dolphins for East Boston ferry, 100,000 feet more or less of piles and timber, to Rendle Stoddard Co., Main street, Chelsea. $31,700.

Contract Awarded, Meridian, Cal.—The contract for making 141,313 foot ditch and lateral excavation, 18,000 foot main canal excavation, etc., was awarded to H. T. Reupke, Box 421, Los Banos, by Reclamation District 70. Price, $33,222.

Piers and Wharf, Pearl Harbor, H. T.—Specification 4799. Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, D. C., for reinforced-concrete concrete piers and wharf at Submarine Base, Pearl Harbor.

Ferry House, New Orleans, La.—The Board of Port Commissioners, New Court Building, is having plans prepared for a reinforced-concrete ferry house, Canal street, New Orleans. $100,000. A. Owen, Interstate Bank Building, architect.

Grain Elevator, Montreal, Que.—Harbor Commissioners awarded the contract for an extension to grain elevator "B" at Windmill Point, providing additional handling capacity of 1,272,000 bushels, to E. G. M. Cape Company, Ltd., 10 Cathcart street.

Contract Awarded, Eudora, Ark.—Eudora Western Drainage District of Chicot County awarded the contract for 3,543,000 cubic yards of excavation and 9.1 mile channel clearing, Schedule D, to McWilliams Company, Inc., Exchange Building, Memphis, Tenn.

Elevator, Indianapolis, Ind.—Perins Mills, Inc., Emerson avenue and Pendleton Pike, plans five-story, 150 by 500 feet, and 1-story, 120 by 200 feet elevator, reinforced-concrete, Pendleton Pike. $250,000. Engineering Investment Company, care of owner, engineers.

Contract Awarded, Detroit, Mich.—Public Lighting Commission, Atwater street, awarded a contract for constructing a wharf and dock, reinforced-concrete, at side of proposed lighting plant, to Greiling Brothers, 100 Bulkhead E, Walnut street, Green Bay, Wis., $417,400.

Dredging, Oakland, Cal.—The Alaska Packers' Association, Wells Fargo Building, San Francisco, awarded the contract for dredging in Oakland Estuary, 1,000,000 to 1,500,000 cubic yard excavation, to American Dredging Company, 255 California street, San Francisco.

Dredging, Manitowoc, Wis.—The contract for dredging Manitowoc River has been awarded to Fitzsimmons & Connell Dredge Company, 10 South La Salle street, Chicago, 23,000 cubic yards of hard pan, $2.30 per cubic yard and 70,000 cubic yards of softer material, $0.44.

Woodwork for Shed, New Orleans, La.—Sealed proposals were received by the Board of Commissioners of the Port of New Orleans, at their office, Suite 200, New Court Building, on June 28, for furnishing and erecting woodwork for the Market street shed. Requisition E. D. 13450.

Levees, Yuba City, Cal.—Reclamation District 1060, care of State Reclamation Board, Forum Building, Sacramento, awarded a contract to Callahan Construction Company, City National Bank Building, Wichita Falls, Tex., for constructing levees, Yuba City, at $500,000 or more.

Levee, etc., Prairie du Chien, Wis.—Crawford Company Levee and Drainage District, Court House, had plans prepared for 1,498,000 cubic yards of river levee work, 1,265,000 cubic yards bluff diversion, 278,200 cubic yards of drainage ditches, 22 miles transmission lines, pumping plant, etc.

Belt Conveyor, Memphis, Tenn.—Sealed proposals will be received at the office of the Mississippi River Commission, First and Second Districts, 1006 McCall Building, Memphis, Tenn., until 11 A. M., July 10, 1923, for furnishing and delivering one (1) belt conveyor. Further information on application.

Dock Front, etc., Conneaut Harbor (Conneaut, P. O.), Ohio.—Bids were received at the office of H. T. Porter, chief engineer, Bessemer & Lake Erie Railroad, Greenville, Pa., on June 25, for a reinforced-concrete dock front and dredging channel between present dock front and new dock front, etc., here.

Levee, New Orleans, La.—Louisville & Nashville Railroad, 10th street and Broadway, Louisville, Ky., and Southern Pacific Railroad, 165 Broadway, New York City, plan levee along Mississippi River, near New Orleans. $100,000. G. R. Smiley, 10th and Broadway, Louisville, Ky., chief engineer of construction.

Freight Shed, New York, N. Y.—J. H. Delaney, Commissioner of Docks, Pier "A," foot of Battery Place, awarded the contract for a new freight shed on pier at foot of Roosevelt street, East River, Brooklyn Bridge Improvement, Manhattan Borough, Contract 1809, to McHarg Barton Company, 1328 Broadway, $82,000.

Contract Awarded, Brooklyn, N. Y.—J. H. Delaney, Commissioner of Docks, Pier "A," foot of Battery Place, North River, New York, awarded the contract for dikes and dredging channel between Mill Basin and Paerdegat Basin, Jamaica Bay, Contract 1797, to Arundel Corporation, foot of Fulton street, $172,220.

Woodwork for Grain Elevator Plant, New Orleans, La.—Sealed proposals were received by the Board of Commissioners of the Port of New Orleans at their office, Suite 200, New Court Building, on June 14, for furnishing and erecting woodwork for the grain elevator sacking plant shed and bins. Requisition E. D. 13517.

Pier, Charleston, S. C.—Sealed proposals were received by the Port Utilities Commission of Charleston, S. C., at its office, Room 712, People's Building, on June 14, for constructing with creosoted piles a pier at Market street, and a wharf at Columbus street, Charleston, S. C. Further information on application.

Pier, Charleston, S. C.—Sealed proposals were received by the Port Utilities Commission, of Charleston, S. C., Room 712, Peoples Building, until noon, June 1, 1923, for constructing a pier (exclusive of earth fill) on Town Creek, Charleston Harbor. Further information on application. H. M. Gallagher, general manager.

Pier Development, Sanford, Fla.—W. T. Donnelly, consulting engineer, of 17 Battery Place, New York, has issued plans and specifications for pier development at Sanford, on behalf of the city, bids returnable June 18. The work is expected to cost about $70,000, being part of a scheme to ship Florida fruit by water from inland points to New York.

Creosoted Timber, New Orleans, La.—Sealed proposals were received by the Board of Commissioners of the Port of New Orleans, Suite 200, New Orleans Court Building, on June 7, for furnishing approximately 520,000 feet board measure creosoted timber, and 1,228 creosoted piles in 70, 75, 80 and 85 foot lengths. Requisitions, ED-13518 and ED-13519.

Reconstruction of Wharf, New Orleans, La.—The Board of Commissioners of the Port of New Orleans, Suite 200, New Court Building, received sealed proposals on June 7 for the reconstruction of the Celeste Street Wharf and for the raising and rat-proofing of the remainder of the landing in rear of the same. Requisition, ED-13471. J. H. Walsh, general manager.

Dredging, Toms River, N. J.—Bids are desired by the Board of Commerce & Navigation, State House, Trenton, for (1) finishing incomplete contract for dredging canal, 75-foot bottom width, edge of Manasquan River; (2) removing remainder of material to make canal of 100-foot bottom width; (3) dredging channel Manasquan River, 100-foot bottom width, as far as funds will permit, $70,000. V. Gelinetta, director.

Wharves, etc., Beaumont, Tex.—The Houston Construction Company, 3102 McKinney avenue, Houston, was awarded the contract for 75,000 cubic yards of dredging and fill, $16,500; 4,500 square yards of porous backing, $2,700; 45 cubic yards of mass concrete, $810; 1,400 lineal feet of wharf platform, $119,000; 1,500 lineal feet of bulkhead, $127,500, and 300 tons of stone riprap, $900; total $267,410.

Bond Issue, Fort Pierce, Fla.—The Board of County Commissioners called an election on a proposed $220,000 bond issue for improvements to the Fort Pierce inlet, on June 25. The proposed inlet improvements include the deepening of the channel to a depth of fourteen feet and extension of both north and south jetties easterly and westerly to provide sufficient protection from the action of the waves and storms.

Sheet Metal Work, etc., New Orleans, La.—Sealed proposals were received by the Board of Commissioners of the Port of New Orleans, Suite 200, New Court Building, on June 21, for one contract for furnishing and erecting sheet metal work and glazing, and another contract for furnishing and erecting downspouts at the new sacking plant of the public grain elevator. Requisitions ED-13542-downspouts, and ED-13543-sheetmetal work and glazing.

Earthwork, St. Louis, Mo.—The La Crosse Dredging Company, Plymouth Building, Minneapolis, Minn., was awarded two contracts by the Mississippi River Commission, 1311 International Life Building, as follows: 645,000 cubic yards of earthwork in Iowa River-Flint Creek Levee District 16, Iowa, and 300,000 cubic yards of earthwork in Louisa County Levee District 15, Iowa; $0.28 per cubic yard, total $180,000, and $0.1875 per cubic yard, total $56,250, respectively.

New Warehouse, Tampa, Fla.—According to recent announcement, work is to start on July 1 on the new warehouse of the Swann Terminals. The building is to include every modern facility used in terminal warehouses, to be five stories high, contain more than 300,000 square feet of floor space and will cost approximately $500,000. Space will be provided for permanent tenants in various wholesale lines. The building will have ample dock, wharf, and railroad facilities.

Dredging, Canada.—The Department of Public Works, Ottawa, Ont., awarded the following contracts to Soo Dredging and Construction Company, Saulte Ste. Marie, Ont., dredging at Saulte Ste. Marie, Ont., $18,200; Randolph-MacDonald Company, Crown Office Building, Toronto, Ont., at Bowmanville, Ont., $6,500; Frontenac Dredging Company, Kingston, Ont., at Port Hope, Ont., $6,500; Dufresne & Marcheldon, Three Rivers, Que., at Nicolet, Que., $10,000, and St. Pierre, Que., $8,000; Lachance, Ltd., 99 Dalhousie street, Quebec, Que., at Riviere du Loupe, Que., $6,000.

Steel Framing, etc., New Orleans, La.—Sealed proposals will be received by the Board of Commissioners of the Port of New Orleans, at their office, Suite 200, New Court Building, until 3:00 P. M., July 5, 1923, for furnishing and erecting at Poland Street Landing under two separate contracts: A—Structural steel framing for shed, approximately 216 tons (Requisition E. D. 13554); and, B—Steel rolling doors, approximately 4,560 square feet (Requisition E. D. 13,555). Requisitions E. C. 13554 and E. D. 13555.

GOVERNMENT WORK

Dredging, Bids Rejected, Baltimore, Md.—U. S. Engineer, Baltimore, rejected bids for dredging in Claiborne Harbor.

Superstructure, Detroit, Mich.—U. S. Engineer, 337 Federal Building, rejected bids for superstructure on west center pier, St. Marys Falls Canal.

Dredging, San Diego, Cal.—U. S. Engineer, Central Building, Los Angeles, received bids, June 2, for dredging in San Diego Harbor, 480,000 cubic yards.

Dredging, Providence, R. I.—U. S. Engineer Office, Providence, received sealed proposals on June 20 for dredging and rock excavation in Black Rock Channel, Buffalo, N. Y.

Dredging, Wilmington, N. C.—Sealed proposals were received by U. S. Engineer Office, Wilmington, N. C., on June 19, for dredging in Scuppernong River, North Carolina.

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Jetty Repairs, Galveston, Tex.—Sealed proposals were received by U. S. Engineer Office, Galveston, on June 22, for repairing, building up and extending the West Jetty at Sabine Pass, Tex.

Stone, Chicago, Ill.—U. S. Engineer, 537 South Dearborn street, has awarded the contract for crushed stone or gravel in Calumet Harbor, to L. D. Smith Stone Company, Sturgeon Bay, Wis., $9,660.

Contract Awarded, Wilmington, Del.—U. S. Engineer Office awarded the contract for dredging Tuckerton Creek, N. J., to Delaware Dredging Company, 139 South third street, Philadelphia, Pa., $9,180.

Bids on Buoys, Tompkinsville, N. Y.—The Superintendent of Lighthouses, Third District, at Tompkinsville, Staten Island, received sealed proposals on June 18 for furnishing and delivering a total of nine buoys.

Steel Oil Barges, Cincinnati, O.—Sealed proposals were received on June 22, by U. S. Engineer Office, Cincinnati, for the construction and delivery of two 1,800-barrel steel oil barges, 100 feet by 30 feet by 6 feet.

Steel Hull, New York, N. Y.—Sealed proposals were received by U. S. Engineer, Room 710, Army Building, 39 Whitehall street, New York, on June 21, for constructing and delivering one steel hull for quarter boat.

Superstructure, Dunkirk, N. Y.—U. S. Engineer, Federal Building, Buffalo, awarded the contract for a stone superstructure on breakwater at Buffalo, to Central Dredging Company, Bangor Building, Cleveland, Ohio. $58,860.

Sale of Condemned Material, Newport, R. I.—A sale of condemned material belonging to the United States Navy will be held at the Naval Torpedo Station, Newport, R. I., on July 3, at 11 A. M. (daylight saving time).

Stone, Wilmington, N. C.—Sealed proposals, in duplicate, were received at the office of the U. S. Engineer, Wilmington, N. C., on June 15, for furnishing and delivering stone, f. o. b. Wilmington, N. C. Proposal No. 1877.

Dredging, etc., Richmond, Cal.—Bids were received June 1, at the office of the U. S. Engineer, Custom House, San Francisco, for dredging 910,000 cubic yards and building 2,000 lineal feet of retaining wall in Richmond Harbor.

Steel Piling, Addison, Ky.—U. S. Engineer, P. O. Box 72, Louisville, awarded the contract for furnishing 435 tons of steel sheet piling, for Dam 45, Ohio River, Addison, f. o. b. Louisville, to Bethlehem Steel Company, Bethlehem, Pa. $26,000.

Dredging, etc., Chicago, Ill.—U. S. Engineer, 537 South Dearborn street, awarded the contract for dredging and pier removal in Calumet Harbor and River, Illinois and Indiana, to Fitzsimmons & Connell Dredge & Dock Company, 10 South LaSalle street, $70,614.

Dredging, New Orleans, La.—Grant, Smith & Company, Raceland, received the contract awarded by the U. S. Engineer, 329 Custom House, for dredging Intracoastal Waterway between Bayou Black and Bayou Terrebonne, 333,000 cubic yards. $0.23 per cubic yard.

Sluice Gates, etc., Florence, Ala.—U. S. Engineer Office, Florence, Ala., received sealed proposals on June 23 for furnishing and delivering 13 sets of sluice valves, operating mechanism for the same, riveted steel pipe and other appurtenances for the sluice section of Wilson Dam.

Proposals for Iron Chain, Tompkinsville, N. Y.—The Superintendent of Lighthouses for the Third District at Tompkinsville, Staten Island, will receive sealed proposals until 2 P. M., on July 5, for iron stud link light vessel chain and iron open link buoy chain. Further information upon application.

Two Steel Oil Tanks, Memphis, Tenn.—Sealed proposals will be received by U. S. Engineer Office, Mississippi River Dredging District, Post Office Box 1017, Memphis, Tenn., for constructing, delivering and erecting two steel fuel oil storage tanks at U. S. Dredge Depot, until 9:30 A. M., July 19. Further information on application.

Dredging, Los Angeles, Cal.—The San Francisco Bridge Company, Nevada Bank Building, San Francisco, Cal., was awarded the contract for widening Los Angeles Inner Harbor entrance channel—Area 3, $419,226; and F. C. Franks Construction Company, American National Bank Building, San Francisco—Areas 4, 5 and 6, $337,053, by U. S. Engineer Office.

Dredging, New York, N. Y.—The contracts for dredging in New York and New Jersey Channels, Area 1 to Great Lakes Dredge Company, 17 State street, $229,425; Area 4, to Morris & Cummings Dredging Company, 17 State street, $226,152; Areas 5 and 6, to Taylor Dredging Company, foot of Communipaw avenue, Jersey City, N. J., $330,534, have been awarded by U. S. Engineer, 2nd District, Army Building, New York.

Lumber, Louisville, Ky.—U. S. Engineer Office, P. O. Box 72, has awarded the following contracts: furnishing 100 pieces 3 and 4 by 10 inches by 30 feet rough oak; 125 pieces 12 by 12 inches by 12 feet oak; 120 pieces 2 and 6 by 12 inches by 14 feet oak, and 35,000 feet long leaf yellow pine, to Marsh & Truman Lumber Company, 332 South Michigan avenue, Chicago, $3,368, and Hayden & Wescott Lumber Company, 80 East Jackson Boulevard, Chicago, $1,606.

New Storage Yard, Florida.—It has been announced from Florida that historic Fort Norfolk, a show place preserved for a century, will be razed and turned into a storage yard for buoys by the lighthouse service unless some unforeseen powers step in to prevent. Application has been made by the lighthouse department to the U. S. Army District Engineer for permission to construct piers, warehouses and storage places for vessels and buoys on the section allotted to that service recently by the Government.

Anchorage Improvement, Norfolk, Va.—Enlargement and improvement of the anchorage grounds off Craney Island and Lambert's Point in the Norfolk harbor has been tentatively approved by the Chief of Army Engineers. Authority for survey and preparation of the project has been received by Major D. D. Pullen, U. S. Army district engineer here, from the Chief of Engineers, with instructions to proceed immediately with compilation of figures to show the costs, the amount of work to be done, and the results to be attained.

Earthwork, New Orleans, La.—U. S. Engineer, 4th District, Custom House, awarded the following contracts in connection with 1,907,100 cubic yards of earthwork in Atchafalaya and surrounding districts: to D. B. Hearin & Son, New Reymond Building, Baton Rouge, St. Cloud Levee, $18,810; to O. O. Ogden, Roumain Building, Baton Rouge, Nina Levee, $77,400; to Lafourche Basin Levee Board, Donaldsville, Live Oak Levee, $20,700; to H. A. Schoenberger, Triumph, Ballay Levee, $4,025; Lee Rice Levee, $4,370; Cromble Levee, $2,208, and Bicks Levee, $3,010; to Lower Coast Construction Company, Ltd., 122 Chartres street, Bowden Levee, $18,720.

MARINE SOCIETIES

AMERICA

American Society of Naval Engineers
Navy Department, Washington, D. C.
Secretary-Treasurer—Commander S. M. Robinson, U. S. N., Bureau of Engineering, Navy Department, Washington, D. C.

Society of Naval Architects and Marine Engineers
29 West 39th Street, New York
Secretary and Treasurer—Daniel H. Cox.

National Association of Engine and Boat Manufacturers
29 West 39th Street, New York City
Secretary—R. R. A. Hand.

United States Naval Institute
Naval Academy, Annapolis, Md.
Secretary and Treasurer—Commander H. K. Hewitt, U. S. N.

American Marine Association
15 Park Row, New York
President—E. A. Simmons.
Secretary—K. W. Heinrich.

The New York Tow Boat Exchange
11 Moore St., New York.
Secretary—Irving G. Keller.

Port of New York Authority
11 Broadway, New York
Chairman—E. H. Outerbridge.
Secretary—William Leary.

Marine Engineers' Supply Men's Association
Room 507, 30 Church Street, New York.
Secretary—Robert P. Jones.

National Association of Masters, Mates and Pilots
National Secretary—M. D. Tenniswood, 308 Vine St., Camden, N. J.

American Society of Marine Designers
Secretary—B. G. Barnes, 202 Kendrick Ave., Quincy, Mass.

National Marine Engineers' Beneficial Association
Headquarters 311-315 Machinists Building, Washington, D. C.
Secretary-Treasurer—George A. Grubb.

Atlantic Coast Shipbuilders' Association
1701 Walnut Street, Philadelphia, Pa.
Secretary—C. S. King.

American Steamship Owners' Association
11 Broadway, New York
President—A. G. Smith.
Vice-President and General Manager—Winthrop L. Marvin.

United States Ship Operators' Association
149 Broadway, New York
President—C. H. Potter.

National Merchant Marine Association
Munsey Bldg., Washington, D. C.
President—Hon. J. E. Ransdell.

The Maritime Association of the Port of New York
78 Broad St., New York City
President—Charles H. Potter.
Secretary—Walter F. Firth.

Lake Carriers' Association
Detroit, Mich.
Secretary—George A. Marr.

Neptune Association
21 Pearl St., New York City
Secretary-Treasurer—Captain John F. Milliken.

Ocean Association of Marine Engineers
15 Whitehall St., New York City
Secretary—Bert L. Todd.

CANADA

Grand Council N. A. of M. E. of Canada
Grand Secretary-Treasurer—Neil J. Morrison, Box 886, St. John, N. B.

GREAT BRITAIN

Institution of Naval Architects
5 Adelphi Terrace, London, W. C.

Institution of Engineers and Shipbuilders in Scotland
39 Elmbank Crescent, Glasgow.

Northeast Coast Institution of Engineers and Shipbuilders
Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

Institute of Marine Engineers, Incorporated
The Minories, Tower Hill, London.

ITALY

Collegio Degli Ingegneri Naval e Meccanici in Italia

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